ELECTRICAL CONTRACTING

NOVEMBER, 1937

Contents

Departments

With which is consolidated The Electragist and Electrical Record
Established 1901

A SERVICE PAPER for electrical contractors, engineers, motor shops, industrial electricians and inspectors, covering engineering, installation, repairing, maintenance and management, in the field of electrical construction — industrial, commercial, residential

McGRAW-HILL PUBLISHING COMPANY, INC.
Publication Office, 99-129 North Broadway, Albany, N. Y.
Editorial and Executive Offices, 330 W. 42nd St., New York, N. Y.

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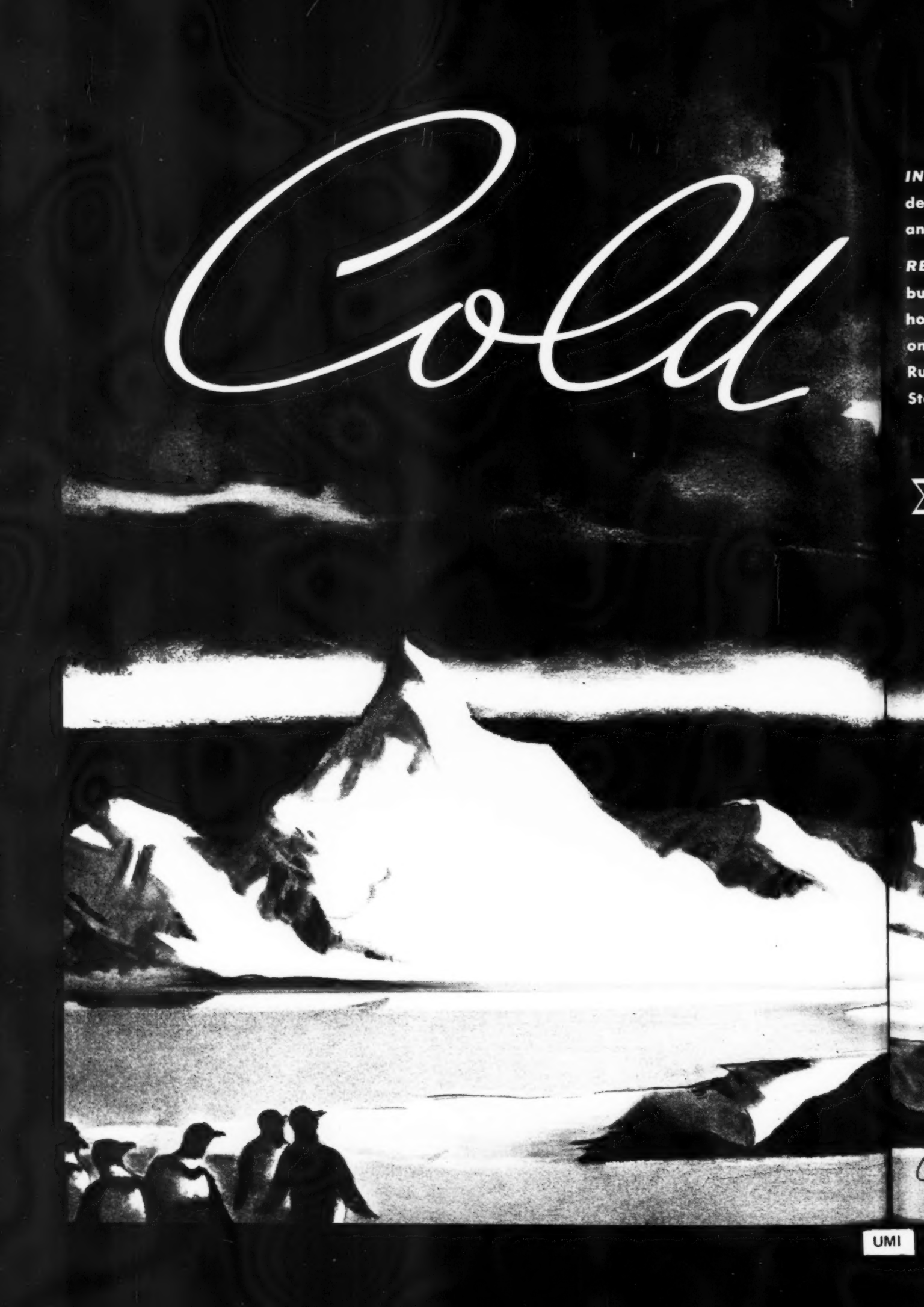
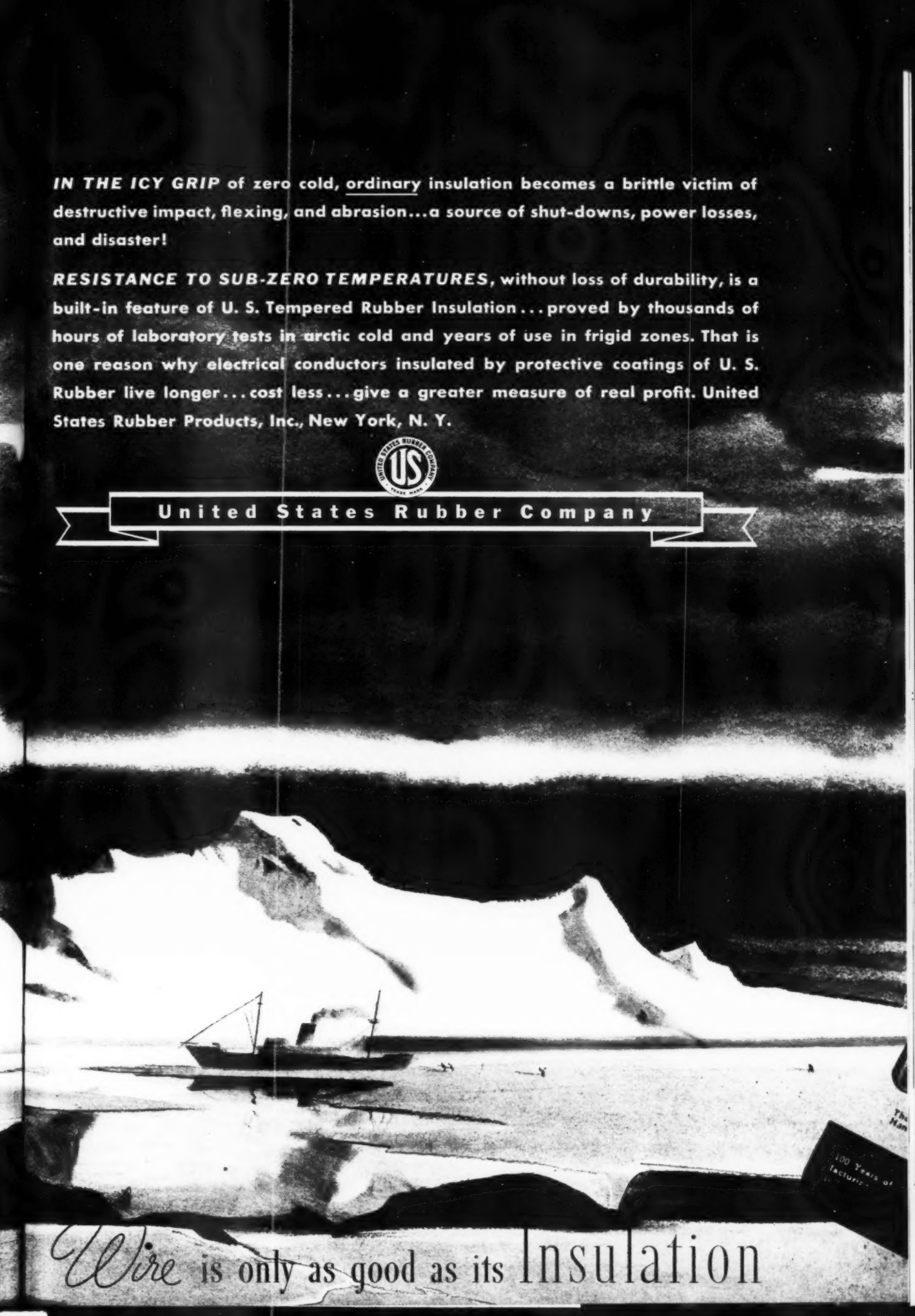
Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W. C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta. Published monthly, price 25 cents a copy. Vol. 36, No. 11. Subscription rates: U. S. and Canada, $2 a year; all other countries, $2.50 a year. Entered as second-class matter August 29, 1936, at post-office at Albany, N. Y., under the Act of March 3, 1879. Printed in U. S. A. Cable address: "McGrawhill, New York." Member A.B.P. Member A.B.C.

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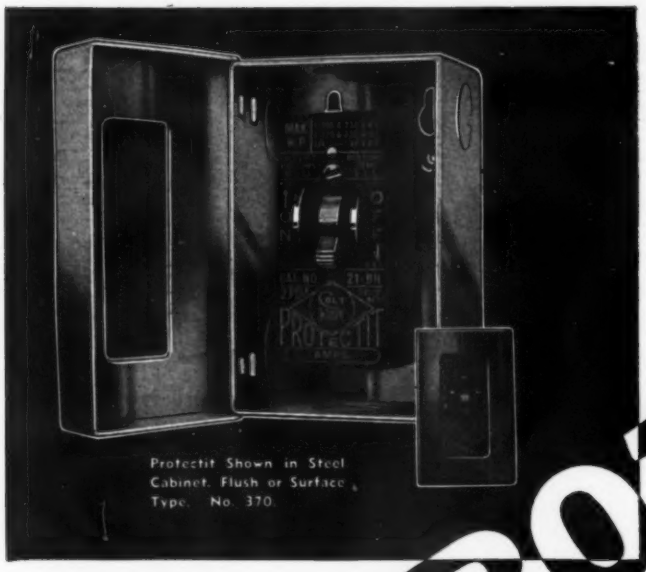

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Boston
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ELECTRICAL CONTRACTING
NOVEMBER, 1937

Take It From Job

LOOK IN YOUR BIBLE—if you can find it. There's a tale about a lad named Job. He was a natural born optimist. The Sabeans butchered his oxen and asses. Fire destroyed his sheep. The Chaldeans killed his camels. His daughters and his seven sons died in a Big Wind. His servants were gone. He still said everything would come out right.

OUR ELECTRICAL MANUFACTURERS AND POWER COMPANIES are worse than Job. They have been deluded by expanding markets and long prosperity into a similar state of complacent optimism. But the Devil is sneaking up on them right now. And I don't mean Roosevelt.

DOWN THROUGH THE YEARS our industry has grown and boomed. We have loaded up American homes, stores, offices and factories with electric light, heat and power. Now we suddenly discover that all these buildings have outgrown their wiring. Our further market, our further growth is being blocked.

TO DEAL WITH THIS CRITICAL CONDITION a group of NEMA members met in December 1935. It was decided to invite the wholesalers, contractors and power companies to join the manufacturers in a "national adequate wiring campaign." Everybody was enthusiastic but the utilities. Finally they too sat in. There have been meetings, plans, proclamations and more meetings—and not a trick turned!

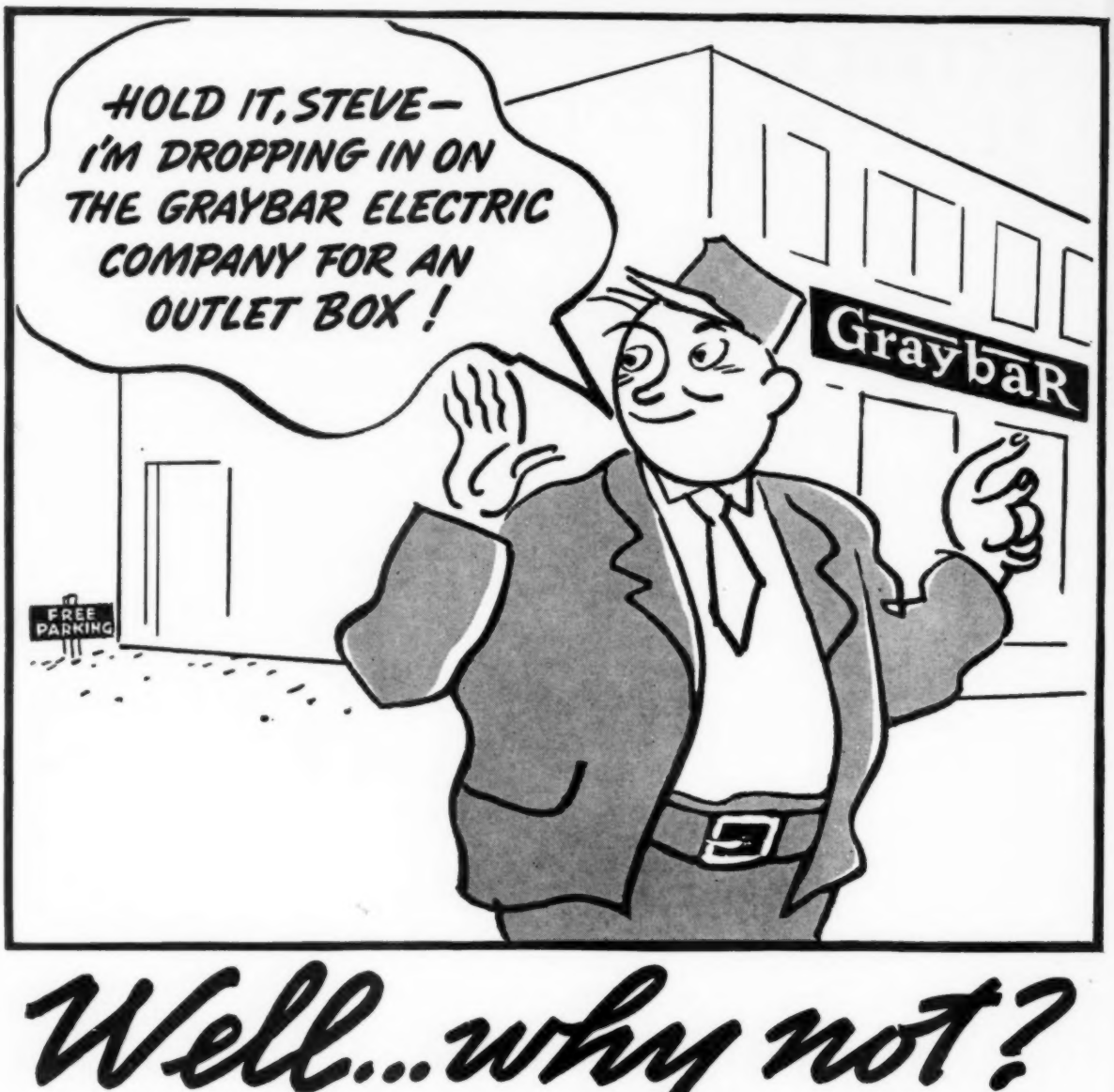
HOW LONG? OH LORD! HOW LONG? Here is not only a problem—a service to be done—but an opportunity for rich profit to all branches of the industry. The headquarters men have been sweating blood and tears, trying to overcome inertia, hair-splitting and procrastination. And almost two years have rolled around.★

PERHAPS I SHOULDN'T BRING UP JOB AGAIN. But according to the Good Book, God grew sick of all his mealy-mouthed talk. So Satan smote him with a plague of boils and soon had him down. And "Job cursed the day he was born."

WELL, IT TOOK JOB A LONG WHILE to square himself with God—and I don't mean Roosevelt—and climb up on his feet again. And it seems pretty dumb that this industry of ours can't take the tip and deal with our situation, before the Sabeans get *our* goats—or whatever it was.

Paul Wheelhouse

★ *Since this was written, the Adequate Wiring Bureau has held a meeting. A Plan Committee has been set up and has a Plan Book about ready. Allah Be Praised! But for some strange reason the power companies insist on starting with a plan for new houses only—and that's what's being done. There are eleven times more old buildings to be wired and it's a hundred times more important—but it's a start and everybody ought to help.*



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BRAZING *special halved joints was relatively simple after joined sections were properly aligned and clamped in place.*

Brazed Bus Bar Joints

By R. A. Goeller

Vice President Hatzel & Beuhler, Inc., New York

How Twenty Tons of Copper Bus Bars Were Assembled by Brazing. They Deliver 36,000 Amperes for Galvanizing. This Company has Already Done Two Large Jobs in this Manner. It Suggests a Wide Range of Application in Transformer and Switchboard Rooms, and for Bus Bar Risers or Feeders Employed in Commercial and Industrial Structures.

IN a recent operation at the Brooklyn conduit plant of Steel and Tubes, Inc., we were employed to install over twenty tons of copper bus bar on what is considered one of the largest electro galvanizing plants in the country. As designed by the engineers of Steel and Tubes, Inc., this installation provides an electrical bus bar system capable of delivering some 36,000 amperes at 4 to 5 volts.

A brazed type of bus bar joint was developed for this work which limited impairment, and also reduced maintenance to the lowest possible minimum, under severe operating conditions. Appreciable savings in copper poundage were also affected as there were 662 brazed joints in this system.

A combination soldered and bolted installation, using drilled holes, was originally specified. However, due to the estimated cost of soldering the joints some of which consisted of eight 6″ x ½″ bars, the figures submitted ran considerably in excess of anticipation.

Alternate estimates were prepared based upon eliminating the soldering and a major part of the drilling, using in place a 6″ lap and a 5-bolt clamp, the fifth bolt to be centered between the other four and the copper drilled to receive it. But with the elimination of the soldering the permanency of the joint depended upon the proper surfacing of the contact faces, and adequate clamping pressures, to avoid joint deterioration through oxidation. This introduced a serious doubt.

Bus bar clamps were next proposed for this installation, and while designing them the idea struck us—why not take a new approach and get out of the rut, as it were? Electric welding came to mind first. We found, however, that available portable equipment would not provide the required capacity for this job. And the cost of special equipment, and the time required for manufacturing it made us abandon the idea.

Our problem was next explained to the Applied Engineering Department of the Air Reduction Sales Company and they were very much interested and confident that a perfect mechanical joint could be made in the field by brazing with low temperature alloys. Discussions followed as to the brazing alloys available and their cost, the type of torch and capacity of gas tanks, methods of clamping during the braze, and last but not least, the skill required.

It was decided that three times the thickness of the copper would give a sufficient lap for the weld, as far as mechanical strength was concerned. In the 6″ x ½″ bus bars, the size representing the greatest bulk, this meant a 1½″ x 6″ lap, or 9 square inches of lap surfaces. Several joints were then made in the laboratory of the Air Reduction Co. The cost of brazing alloys, gas and time expended in making these joints was found to be:

For ½″ x 6″ Copper bus, lapped 1½″
Material, per joint—$0.574
Torch time per joint—3 minutes
Cleaning, fluxing and assembling time—5 minutes

For ¼″ x 4″ Copper bus, lapped ¾″
Material, per joint—$0.104
Torch time per joint—1½ minutes
Cleaning, fluxing and assembling time—3 minutes

Then fall-of-potential and tensile-strength tests were made of four sample brazed copper joints by the Electrical Testing Laboratories. From their detailed report three outstanding facts were obvious—

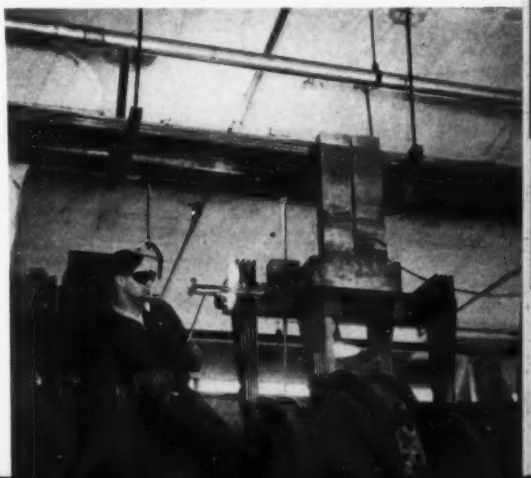
A. That two pieces of 6 x ½″ copper with a 1½″ lap, joined by low temperature brazing alloys has a lower fall-of-potential by .2 M.V. than a similar length without a splice.

B. That the tensile strength of the joint is extremely high, as indicated by the fact that two brazed 6″ x ½″ pieces parted at 68,500 pounds.

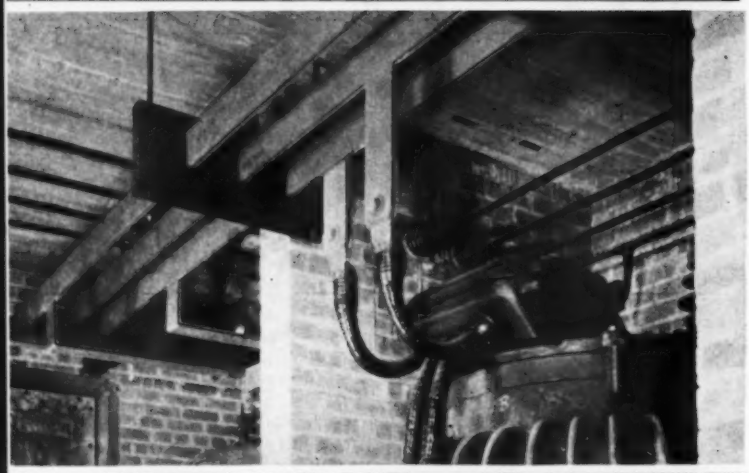
C. That a lap of 1½″ on the 6″ x ½″ bus bar was ample—both mechanically and electrically.

With these test reports before him F. M. Darner, chief engineer of Steel and

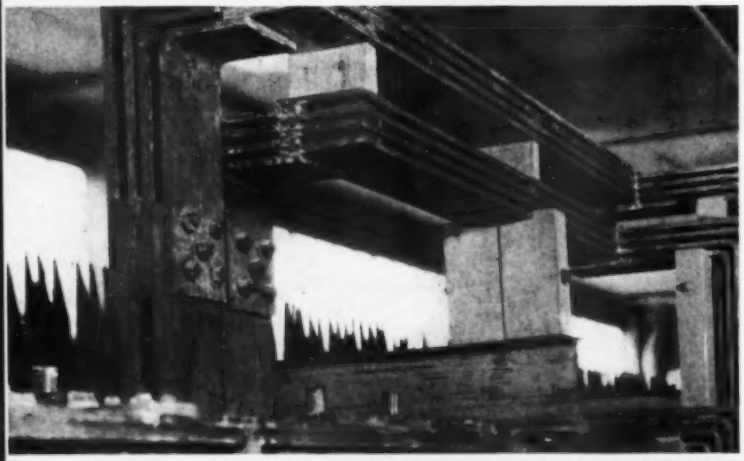
ACETYLENE HEAT *applied to clamped busses provided brazed joints free from loose contact or future oxidization.*



COMPACT AND TROUBLE - FREE, *this complicated assembly of brazed ½-in. by 6-in. copper buses leads up from a 10,000-amp. generator through massive shunts to galvanizing tanks.*



WIDE APPLICATIONS *for brazed connections are suggested by this bus bar rack in the transformer room. Here two ¼" x 4" bars per phase lead out from three 500 kva. transformers to a 460-volt distribution board.*



IMPERVIOUS *to corroded contacts, this compact group of busses at the plating tanks was run under steel members with a minimum requirement of space. The bolted section is for removing rubber coated bars that lead into the tank.*

COPPER ECONOMIES *resulted from reducing the normal lap of joined busses to three times their thickness. These ¼" x 6" busses are lapped 1½ in. at brazed joints.*

Tubes, Inc., approved the brazing method as proposed.

Now came the ordering of the necessary gas equipment, torches, Sil-Fos low temperature brazing alloy and flux. Due to the mass of metal in each joint, it was decided to use a two-flame tip and three-cylinder oxygen and acetylene manifolds, so as to provide an adequate flame and uniform pressure for the longest possible time.

Sil-Fos was selected because it can be obtained in .01-inch thickness and has a low melting point of 1,300° F. which means low gas consumption. Sil-Fos is a low brazing alloy developed by Handy & Harmon and consists of 80 per cent copper, 15 per cent silver and 5 per cent phosphorus. Phosphorus acts as a fluxing agent and is consumed when heat is applied to the joint. This leaves an alloy essentially copper and silver which accounts for the low electrical resistance of the joint.

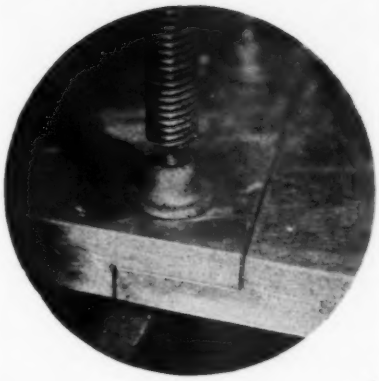
A Simple Operation

The method of making the joints was simple. The contact faces of each bar were prepared with a power driven sander. Then a strip of brazing alloy was cut about 1/32" shorter than the lap. After flux was applied to both sides, the alloy was placed between the two bars and clamped by means of two 'C' clamps, set up tight enough to hold the bars in position. The joint was now ready for the torch and heat was applied until the alloy ran out at the edges. Then with an extra turn of the 'C' clamp, the removal of the heat, and a slight cooling time the joint was complete. In special cases brazing alloy was used in rod form, similar to solder, to fill voids that could not be handled otherwise.

Accompanying sketches illustrate several joints used on this operation and the formula which was applied for the various laps. One sketch shows how splice plates were adapted on a subsequent operation, so that busses could be aligned at the joints rather than offset. In long runs in exposed locations, this method was often desirable.

It is quite obvious too, that changes in direction or taps at more or less than 90° can be easily accomplished. Also flexibility is provided in assembly because one bar can slide over the other until properly positioned and the joint can then be completed. Moreover, joints made in laminated busses with this method do not have the bulky appearance of the old method.

In making brazed joints, expansion of the metal is a factor, and care must be taken in fabrication to allow for this,



HALVED JOINTS *were employed in plating tanks. After brazing, the sections of bus bar were rubber-coated for submerged operation.*

and the subsequent contraction. However, at the plating tanks the brazed joints provided freedom from acid corrosion and the subsequent deterioration normally present in a clamped or bolted joint where reaction of dissimilar metal under acid conditions will develop failures. Space saving resulted too, because there were no bolt heads or clamps to contend with. On the tanks a serious problem was solved where the anode bus, consisting of three 6" x ½" bars in parallel, had to be run along between the top edge of the tank and numerous metal supports running at right angles. Another problem was nicely solved within the tanks, where it was necessary to splice some 6" x 1" cathode bars that after fabrication were rubber coated. Clamping or bolting would have been difficult. The picture shows how this joint was made. It was as one piece, rubberizing was simplified, and protection from acid was assured.

It is obvious that these joints which are impervious to corrosion, mechanically strong, have no greater resistance (less in fact) than a solid piece of copper, and will not change during the life of the joint, give advantages of paramount importance. The question naturally arises as to what this method costs over the old system of bolts or clamps.

The saving in copper poundage at the joints was found to be a worthwhile item. The following estimated savings are based upon a 6-inch lap on the 6" x ½" bars for the clamping or bolting method, as against a 1½" lap used for the brazing process. For smaller sizes the lap was reduced in proportion to thickness.

8—1"x6"	Rabbited joints...	24 pounds
320—½"x6"	Right Angle " ..1410	"
6—½"x5"	" " " .. 6	"
40—½"x6"	" " " .. 102	"
96—½"x5"	" " " .. 72	"
192—½"x4"	" " " .. 103	"
Total savings in pounds..1717		
Total savings in dollars..$309.06		
($.18 base—1717x$.18)		

Against an approximate total 4,233 sq. inches of brazed joint, we had the following material costs:

Acetylene & Oxygen	$232.00
Sil-Fos & Flux	87.50
Welding torch & accessories (50% depreciation)	149.23
Total material cost	$468.73

The cost of material per square inch of joint is therefore approximately 11¢. Joints for 6 x ½" bus having an 1½ inch lap were the greatest number. The average costs of material for such joints, at 9 sq. inches x 11¢ was 99¢.

For a joint in 6" x ½" bus with 1½" lap the overall field costs were:

Labor, welding & assembly (based on $1.70 per hr., plus 20% supervision)	$.52
Oxygen, Sil-Fos, Flux	.99
Misc. Expenses	.03
Copper ($.18 base) bars—lapping 1½"	.26
	$1.80

For a bolted joint of the same size bar, but having a 6-inch lap, the figures are:

Labor (rate as above) based on drilling ten ¼" clearance holes with power driven drill press (5 in each 6x½" bar)	$2.00
Labor for assembly	1.05
5—¼"x1¼" steel bolts, nuts & washers	.40
Copper ($.18 base) bars at right angle —lapping 6-inches	1.03
Miscellaneous expense	.05
	$4.53

For a bolted joint using punched holes, our analysis of cost is:

Punching holes (10)	$1.20
Labor—extra filing	.30
Labor for assembly	1.05
5—¼"x1¼" steel bolts, nuts & washers.	.40
Copper ($.18 base) lap same as drilled joint	1.03
Miscellaneous expense	.05
Total field cost	$4.03

The cost of a clamped joint based upon using one pair of 6" x 6" cast iron clamps is estimated:

Labor for assembly (wage rate same as above)	$.75
1 pr. of cast iron bus clamps	4.85
Copper ($.18 base)—lap same as drilled or punched joint)	1.03
Miscellaneous expense	.05
Total field cost	$6.68

Comparison between equivalent joints with drilled holes, punched holes or bus clamps as compared with the brazed method is:

Joints with drilled holes	$4.53
Brazed joint	1.80
Total saving per brazed joint..	$2.73
Joints with punched holes	$4.03
Brazed joint	1.80
Total saving per brazed joint..	$2.23
Joint with clamps	$6.68
Brazed joint	1.80
Total saving per brazed joint	$4.88

From our experience it seems inevitable that joining of bus bars by the low temperature brazing alloy method will grow rapidly, when its possibilities are more generally understood. Its application to electrical uses is just one more indication showing the interdependence of industry and research in basic problems. The circumstances surrounding the adoption of brazing alloys in the electrical field proves that the biblical adage is as fresh today as when first quoted, "Seek and ye shall find."

TYPICAL ASSEMBLY OF JOINTS AND TAPS FOR BRAZING COPPER BUS BARS.

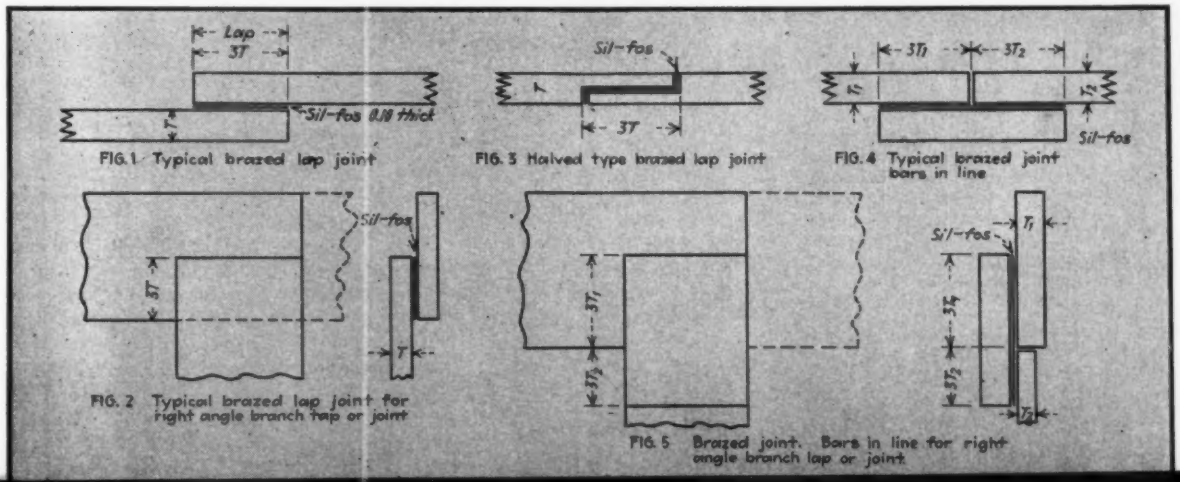


FIG. 1 Typical brazed lap joint

FIG. 3 Halved type brazed lap joint

FIG. 4 Typical brazed joint bars in line

FIG. 2 Typical brazed lap joint for right angle branch tap or joint

FIG. 5 Brazed joint. Bars in line for right angle branch tap or joint

With N E C A in Los Angeles

Successful through outstanding attendance from all sections of the country, this Thirty-Fifth Convention presented a constructive program to clarify pressing industry problems.

CONVENTION scarred old-timers are enthusiastic about the Thirty-fifth Convention of the National Electrical Contractors Association, just held in Los Angeles. It presented a meaty program that struck some keynotes and clarified the problems that are pressing for solution. It provided entertainment on the scale possible only on the Pacific Coast, where the resources for sight-seeing are so spectacular. It brought action that made men feel that something real had been accomplished for progress. That is a perfect combination for any meeting.

From the standpoint of attendance the success was outstanding. A special train brought 142 men and women from the Middle West and East—four carloads from the Southeast, two cars from Chicago. Cavalcades of automobiles came in from the Northwest and the Rockies. Innumerable cars drove in some 1000 miles from Texas, and some from cities up and down the Coast. Registration ran 444 and several hundred more dropped in for single days or sessions and did not sign. There were 185 contractors, 170 ladies, on the official list and they embraced the substantial men of the industry. The bulk of the business was there.

The principal papers are presented here in abstract, just the kernel of the man's message, because the space does not permit complete publication. Read

them. Then ask NECA headquarters for the full text of those you want to read in detail. And the reading will pay you well.

A. L. Stone, of the Los Angeles Convention Committee, opened the program with a big hearted welcome. Earl Peak followed with his presidential address, reviewing the year and outlining the progress and purpose of the Electrical Industry Promotion Committee. It is his baby and one of the most constructive and promising contributions of recent years. He laid down clearly just what it offers in local benefits to those who want to take advantage of it.

Charlie Swartzbaugh wound up the Monday morning meeting in his delightful way. In between stories, he registered his message from NEMA and showed what can be accomplished by industry team work, especially in the wiring field. Then the whole crowd lunched with the Los Angeles Electric Club.

The most vivid picture of local cooperation came from W. C. Mainwaring, utility man from Vancouver. There the power company guides the local electrical family in an organized program and restricts its wiring installation work to contractors who play the game.

Earl Whitehorne, Editor of *Electrical Contracting,* came next, calling on the industry to face the market and reorganize to rewire America. If we do not, he says, public opinion will rise some day, outraged because both lighting and appliances are inefficient due to tight wires. Then Sears-Roebuck or the government or some other interest will take on the job and set up a chain of wiring shops. And the contractor will lose 22,000,000 customers.

Walter L. Stickel, of the Electrical Development League of Southern California, followed with a fine talk on "Taking Adequate Wiring to the Public." He urged contractors, where necessary to meet close competition, to submit two bids—an extra plan and figure on an adequate job—so they can be compared.

On Tuesday, K. D. White of Columbus, Georgia, gave a vivid picture of the pressing need for industrial modernization and how to sell it. William A. Cyr, Pacific Coast Editor of *Electrical Contracting,* spoke for the customer, with charts and costume, impersonating the industrial manager, the merchant, the speculative builder and the householder. Then A. V. Thompson, of the General Electric Company, told the story of highway lighting for safety, what can be done to reduce traffic fatalities and what it means to the contractor.

Closed sessions for contractors only were the feature of Wednesday. First came the elections. Earl Peak was continued as president for another term of two years, and Ralph Walker was made vice president. Also three executive committeemen, whose terms were expiring, were re-elected—E. C. Carlson of Youngstown, H. C. Evans of Kansas City and S. G. Hepler, of Seattle; and D. B. Clayton of Birmingham, was selected to succeed Ralph Walker in the Southeast. An old-timer, Solo-

AS NECA SPECIAL *(upper left) rolled out of Chicago; Welcome! says Commissioner Hoch, the city's host, to President Peak (right). Golf trophy being presented Harold Thane by Glen Arbogast (lower left); and, (right) W. C. Mainwaring, Vancouver, speaks of practical local harmony.*

Industry Progress

By
EARL PEAK
President, Marshalltown Elec. Co. and National Electrical Contractors Assn.

THREE THINGS stand out this year—The Handbook of Interior Wiring Design, the National Adequate Wiring Bureau, the Electrical Industry Promotion Committee. Each has brought closer cooperation in the industry. The value of national cooperative promotion has been demonstrated by the Better Light Campaign. The Electrical Industry Promotion Committee will now bring the support of all branches of the industry to national programs that promise benefits in local cooperation. The value of local cooperation among contractors is proven in cities where Voluntary Agreements have established good bidding practice. NECA has made outstanding contributions this year. It has gained in both members and financial strength. But though NECA can build the track and furnish the locomotive, the local groups must supply the coal and shovel it. Local leadership is vital.

Wiring Promotion

By
C. E. SWARTZBAUGH
President Swartzbaugh Mfg. Co. Toledo.

WE HAVE a situation to meet. Wiring promotion is entirely possible on a national scale. We must tie it to that great American sport, "Keeping up with the Joneses" by selling Jones families in every city. Earl Peak has started the electrical industry promotion committee. Ed Brand's joint committee has produced a Handbook of Interior Wiring Design. The National Adequate Wiring Bureau is established, backed by all industry branches. A Plan Committee is now bringing out a Plan Book. We are ready to go. The objective is to launch a broad sales program to sell more adequate wiring into new and old homes—to build more markets for appliances and adequate consumption—to tie in architects, builders, realtors, lenders, press and public. National headquarters will work out of NEMA. The movement is ideally timed.

Our Local Team Work

By
W. C. MAINWARING
General Sales Manager, British Columbia Elec. Railway Co. Vancouver.

TWO LOCAL organizations in Vancouver were united in an industry organization, working in harmony with a Service League. The utility took leadership. Misunderstandings were cleared up. Utility sales plans were changed to give dealers equal opportunities. Range and water heater wiring is allocated to association members. Complaints are cleared through an industry committee. Utility pays contractor cash, collects monthly, including extra work. The Association worked out simplified practice at reduced wiring costs, provided sales training, advice to customers, organized promotion, monthly magazine, credit bureau, price book service, cooperation among groups and good fellowship in industry. Price cutting is banished in open competition by establishing standards of practice and standards of conduct.

Modernize Industry

By
K. D. WHITE
Walker Electrical Co. Columbus, Ga.

INDUSTRIAL progress is largely a process of continuing modernization. This brings continual opportunity for electrical contractors. Only two per cent of the assets of a manufacturing plant represent its lighting installation—less than two per cent of the payroll. Yet light is vital to men and machinery. Many production processes can be improved by better use of electric motors, control, heating, welding. Adequate copper is essential at every step. The contractor needs instruments to determine present conditions and demonstrate need for better wiring and equipment. All such installation work in factories should be done by contractors. The plant electrician lacks experience, facilities, and specialized skill. The contractor offers many advantages. All branches of the electrical industry should cooperate to keep industrial electrical modernization in the contractor's hands.

mon Davis, who was the chairman of the first NECA nominating committee in 1902, was there and took a bow.

Then came a paper on "Apprentice Training" by Walter Collins of Chicago, read for him because unfortunately he dropped off the train sick at Albuquerque. He laid down a challenge. Are we to be no more intelligent in our workmanship than "the mob"?

J. Edward Chandler, of Los Angeles, followed with experience in the benefits of a voluntary code. Then came a report by Roy M. Butcher on the working of the California Contractors' license law, that is pointing the way to industry discipline. Then came a paper on "Meeting Motor Repair Shop Problems" by William J. Wheeler of New York, president of the National Industrial Service Association. He presented the program and the progress of that organization and urged a full natural cooperation and affiliation with NECA, to tie the work of motor shop men and contractors closer together. Then J. J. Newitt, Secretary of the Southern California NECA Chapter talked on how to keep members interested.

About 250 members of local "Contractor Exchanges" attended the Wednesday sessions as special guests. They saw a dramatic skit presented to the meeting by employees of Southern California Edison Company, demonstrating the importance of keeping proper and adequate records on construction work.

Wednesday noon, W. J. Wheeler, President of the National Industrial Service Association, met with the contractors present who were interested in motor shop work, members of both the Northern and Southern California Motor Dealers Association. As a result the two western groups decided to affiliate with N.I.S.A.

The banquet Wednesday night was a brilliant affair. More than 1000 dined in the famous Biltmore Bowl, saw George Patterson receive the McGraw Award and watched a delightful floor show, for which Hollywood furnished the talent. Then they danced.

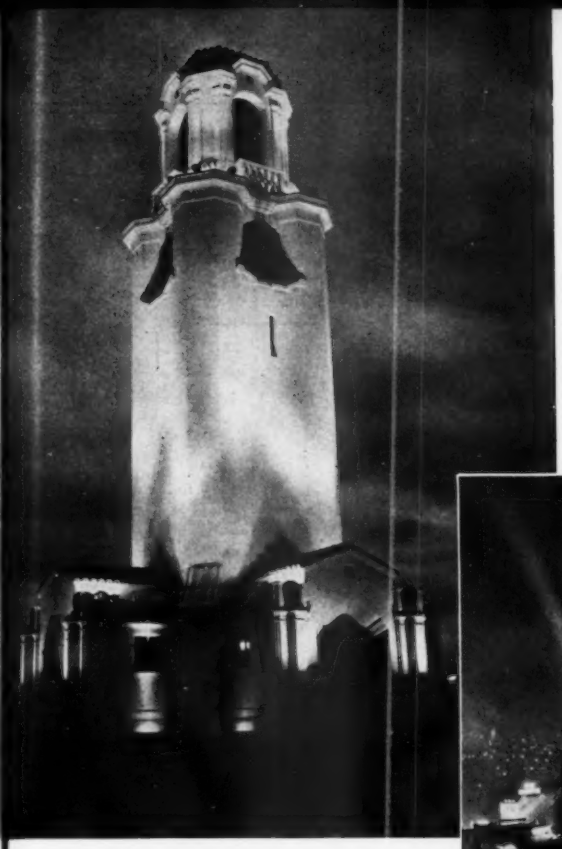
Thursday morning wound up the sessions with an address by the leading wholesaler of Los Angeles, Harry L. Harper of the Graybar Electric Company. He talked of the possibilities for closer cooperation with the contractors. Then W. Ballentine Henley, of the University of Southern California gave an inspiring address on "Cooperation in Business." "You have attended this convention," he said, "So what?" And he drove in the need for individual responsibility for social progress. Men must take initiative in the selection and defense of standards—beyond mere business profit. It is where individuals shirk this responsibility that government steps into business affairs.

And finally Ralph Walker made a masterful analysis of the need for an electrical industry fair trading policy. He built up the possibilities against the background of the 15 years' experience of the electrical industry in Great Britain. A committee was authorized to prepare a code of ethics on distribution policy to be developed in cooperation with the other branches of

TEXANS ALL *(upper right), H. A. Hood, Houston; J. R. Jameson, Dallas; Ed. Delaney, Galveston; J. R. Pete and J. F. Copeland, Houston—with their ladies. (Right) Harry Harper, Graybar and Earl Peak check up. (Lower left) Past presidents Clyde Chamblin of San Francisco and Leo Mayer of Chicago, Managers C. C. Cadwallader, Detroit and E. H. Herzberg, Milwaukee with their wives.*

Light Shines on the Coast

NECA delegates visiting the Far West saw many striking and interesting examples of modern lighting, such as these—

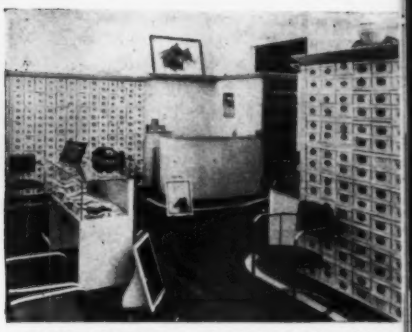


ARCHITECTURAL BEAUTY *displayed by intriguing floodlighting.*

PALMS AND BEAMS *of light suggest a Hollywood premiere, and so it is.*

PACIFIC COAST *industry is also awake to the benefits of high-level lighting—A blended mercury-mazda system in an airplane factory.*

THIS MAMMOUTH *hospital in Los Angeles shows that big western buildings too have high lighting standards.*



SMART SHOPS *smartly lighted, like this shoe store, interest the eastern visitor.*

LIGHTED BEACH *spots provide much night-time enjoyment through the great play-area.*

LUMINOUS STOREFRONTS *and bright interiors mark Pacific Coast outdoor markets.*

AT BOULDER DAM. *Mr. and Mrs. Larry Davis (upper left) did some looking, too. Off smiling, Mr. and Mrs. Walter Collins (right) of the Chicago group left the special at Albuquerque because of Walter's sudden illness. Manhattan conferees S. J. O'Brien and Lincoln Bush (lower left) register New York harmony. Executive huddle (right) finds Norman Pierce, Chicago, Sam Hepler, Seattle and A. L. Stone of Los Angeles making plans with an unrecognized fourth.*

the industry. Also, it was announced that next year's convention will be held in Detroit.

An amendment was made to the constitution authorizing the establishment of a labor relations committee to be representative of all districts.

The convention closed on Thursday and everybody was sorry to go. But the Special pulled out for the Northwest and one by one the automobiles headed east, north and south along the highways. The party was over. But it was a good party, rich in practical benefits to contractors in their own business, as well as in the memories of Los Angeles hospitality and the grandeur of the Pacific Coast itself.

Patterson Receives McGraw Award

G. W. PATTERSON
Commander of the Unit

George W. Patterson, chairman of the NECA Cost Data Committee, received the James H. McGraw Award. It was the feature of the banquet, Wednesday evening. The citation was as follows:

George W. Patterson, president of the Patterson Electric Limited, of Toronto, as chairman of the Cost Data Committee of the National Electrical Contractors Association, recognized that the labor cost data gathered and compiled by NECA over a period of nearly twenty years, represented one of the most important economic resources available to electrical contractors. It failed to gain widespread acceptance and use, he believed, because the data was not presented in a practical, convenient and understandable manner. He conceived the idea of developing from this reservoir of labor cost data, a flexible loose leaf estimating manual, in ready reference form, with all subjects organized in logical sequence under general classifications, easily adapted to the needs of estimators. He proceeded to enlist the coperation of contractors and estimators, comprehensive re-check and revision of existing cost material, and initiated the development of new and additional data, through extensive research and analysis. Out of it he established the present NECA Manual of Labor Units and its supporting monthly service.

Through his splendid initiative and enthusiasm, his tireless energy, and his own personal example, he has built up a widespread supporting cooperation among a steadily growing number of voluntary collaborators about the country; and has turned this static collection of labor cost statistics into a vital working tool, that today is recognized as one of the most valuable practical aids available to the modern electrical contractor. And to accomplish this he has unselfishly given his time and thought and labor and engineering experience, working forward persistently month after month, in the belief that a better understanding and broader use of sound labor unit tables will raise the standards of business practice in the electrical contracting industry.

In recognition of this constructive contribution to the advancement of the contractor-dealer branch of the electrical industry, the judges have awarded to Mr. Patterson the Contractor-Dealers Medal and Purse for 1937, given under throughout the country, in a methodical,

I Am Your Customer

By
WM. A. CYR
Pacific Coast Editor, Electrical Contracting

WHY NOT TRY to understand me? I am a factory manager: you want to bid on my new addition. Shall I use you to check my plant electrician? Or can you really help me? Can you think of my problem instead of yours? I am a merchant: I don't like competitors to get ideas ahead of me. I spend money on my store. Do you come in and show me how? I am the speculative builder: I put dough in bathrooms, kitchens. Nobody asks about wiring. Help me to beat competition and I will pay you for it. I am the home owner: We are planning a house to enjoy for years. Help us get convenience, health, comfort, safety. Show us our future needs—not just something cheap. I am your customer. Why not work more for me.

Apprentice Training

By
J. W. COLLINS
Electrical Contractors Assn. Chicago.

ELECTRICAL contractors are competing for business with a mob of handy men. They buy materials at about the same price. Do we handle labor more intelligently? We are recruiting mechanics from the same sources, training them at the customer's expense. Yet 50 per cent of our work must be done without direct supervision. It requires both training and book learning. Through the past eight years we have whittled down forces, keeping only our best men. Their average age is now 46 years. Too many know only one type of construction. No trained replacements are being prepared. Apprentice training has 15 years' experience in this trade. The plan is practical, old as industry. It offers our best basis for superiority over the mob. A system of indentured apprentice training must be established under the sponsorship of NECA.

Trade Strife Cured

By
J. E. CHANDLER
Chandler Electric Co.
Los Angeles.

MOST TROUBLE between competitors comes from misunderstandings. Despite NECA efforts, new contractors have come into this trade too fast to educate them to mark up their jobs enough to prosper. Lacking that, these men have been poor salesmen. Manufacturers and wholesalers have gone around them. So the contractors are a bottleneck in wiring and appliance business. Chaos has followed. Our Code of Fair Competition has ended this strife in Los Angeles. It took two years for 17 competitors to sign our Fair Trade Agreement. Now in ten months we have 400 members and an almost unbelievable amount of cooperation between contractors. We have stabilized a reasonable markup through cost surveys. We are eliminating destructive competition. Cooperation has become profitable.

Our License Law

By
ROY M. BUTCHER
Chm., California State Contractors License Bd.

THE CONTRACTORS License Law of California has now operated long enough to show results. Electrical contractors must qualify for a license and cannot do business without it. In a word, it requires responsibility, fair dealing, good workmanship to protect both the public and competitors. Inspectors file 12 to15 criminal complaints a month and 90 percent bring court convictions. Since 1929 licenses of 923 electrical contractors have been suspended or revoked, of which 30 percent were reinstated within a year. There are now 1536 men on the "black list" unable to do contracting in the state. In the past year, 4000 licenses have been issued and 1000 denied because good reputation could not be proved. Enforcement is greatly aided by local gossip of convictions.

the James H. McGraw Award.

The presentation was made by Earl Whitehorne for the Committee of Awards. He called the work that Patterson is doing, the most definite practical service now being rendered to the electrical contractor for the improvement of business standards in the industry. He put it up to every member of NECA not only to use this estimating system himself but to take initiative and responsibility, each man in his own town, to establish it as standard practice among all the local contractors. It may be made the basis of a local coordination of great benefit to all.

The judges who selected Mr. Patterson for this honor were—E. G. May, Albany, N. Y.; Howard L. Miller of the Utilities Engineering Co., Philadelphia, Pa.; S. J. O'Brien of the S. J. O'Brien, Inc., New York, N. Y.; and J. Roland Stolzenbach of the Roland Electrical Company, Baltimore, Md.

An Unforgettable Adventure

To those who have not been to the Pacific Coast, there is not much use trying to describe what the contractors and their families on the NECA Convention Special saw. A valley wide as from New York to Washington and long as from Boston to St. Louis just doesn't make sense to the easterner. And mountains ten times too big and beautiful because they are naked of trees, fail to stir the ear. But they delight the eye with their infinite form and color and they move the heart.

The train left Chicago Tuesday morning, October 12, with fourteen cars. Believe it or not, there were all compartments and bedrooms—diner, lounge, observation—and 145 conventioners aboard. They traveled west across the prairies to Kansas City and down to Albuquerque and the desert. Then came the one sorrow of the trip. Walter Collins Secretary of the Chicago Contractors Association, was taken to the hospital with pneumonia and he and Mrs. Collins stayed behind. But good reports of recovery followed the train and softened the regret.

At the Grand Canyon—the party drove around the rim, gazed across the 13 mile wide chasm and peered down the 6000 feet to where the Colorado River flows for 217 miles between these towering cliffs. They watched the slowly changing shadows paint the canyon in rich browns and reds and blues.

At Boulder Dam they stood on a big platform and were hoisted 1000 feet up from the river's side and set down across the canyon. They saw the dam and the power house and had a boat trip on the lake.

Convention over, they journeyed through orchards up the San Joaquin Valley to incomparable Yosemite. There they looked high through monster yellow pines and incense cedars to sheer cliffs rearing 3300 feet towards the blue sky and glorified with waterfalls of floating silver lace. At Mariposa Grove they paused in the presence of these giant sequoia trees that saw ten centuries of life before Christ was born.

Then to San Francisco for a day, viewing the Golden Gate and this entrancing harbor with its verdant isles and piled up mountains. Then an industry dinner and on to Portland, 24 hours away.

At Portland the party drove up the famous Columbia River Highway, through inspiring river and mountain scenery, vast and mighty, then past snow-crowned Mount Hood to the Bonneville Dam. Then another industry banquet and on to Seattle, an industry luncheon and more scenic beauty of hill and bay and snow-capped peak. Then east through the Rockies and across the plains.

The whole tour was perfectly arranged, comfortable and continuous in changing impression and interest. It was an unforgettable adventure, rich in new experience and new friendships.

GENERAL MANAGER DAVIS *(upper left) stops for a word at an exhibitor's booth between sessions. Ralph Walker, Atlanta (at bottom left) in a huddle with R. W. Mitchell of Buffalo, A. H. Wilson, Washington and E. H. Golk of Chicago.*

CANYON THRILL *(left) Convention party hoisted 1000 ft. across Canyon at Boulder Dam. Tour party at Grand Canyon (top right) with Larry Davis at left end and Steve O'Brien at right end. At Las Vegas (lower right) Ralph Walker takes a foreground stance.*

Pleasure in Los Angeles

Southern California is organized for hospitality. It is the spirit of the country. It is in the well known air. But also they have experience. And so the entertainment program was full of interest to both the men and the ladies who accompanied them. From the moment the train arrived and the Mexican Greeters, in their big hats, began to play guitars and sing and dance, there was plenty of pleasure.

At six o'clock on Sunday evening the crowd went to the airport. Big TWA transport ships were waiting and there was a flight over the city—the innumerable cities—that dot the coastal plain. They saw the lights of Los Angeles, Pasadena, Santa Monica, sparkling in the night like soft, sprawling beds of restless, sleeping jewels.

Tuesday the ladies took an all day trip over to San Pedro and then, by steamer, to Catalina Island. Some were a wee bit seasick, but Catalina came and all the unpleasantness was lost in "Oh!s" and "Ah!s." For the beauty of this lovely hill-crowned island, with its palms and live oaks, its lovely drives and charming Spanish architecture is irresistible.

That night everybody went by bus to Hollywood. A tour of the studios showed where and how sound pictures are made.

Tuesday brought an all day tour of the beaches—where the great Pacific rolled up in little rippling waves. Then on through Beverly Hills, where the movie people have their glamorous estates. Then on to Glendale, Eagle Rock and other suburbs of the old City of the Angeles. That afternoon the men took time out for golf.

Tuesday evening, before sun down, the whole crowd drove to the top of Mt. Wilson, and lost what adjectives they had left. For the road climbs up through naked, brown, majestic mountains, scarred and folded into a vast, inspiring scenic grandeur. And at the top, 6,000 feet above the plain, among the pines, they dined and visited the famous Wilson Observatory. They looked into the faces of the moon and stars and

TWO ACES—*Greeter and Convention Chairman A. L. Stone (top left) lines up with Manual-Sponsor George W. Patterson of Toronto. NECA Magic Carpet—Sam Hepler, Seattle (left center), E. W. Kearns, Chicago, and Bob McChesney of Washington. Southeastern Chapter (bottom group) shows its "Solid South" representation.*

Motor Shop Problems

BY
W. J. WHEELER
Pres., Maintenance Co. and N. I. S. A.

THE OPERATION of industrial electrical systems and the satisfaction of the contractor's customers is dependent on the servicing of electrical equipment. The operating problems of service shops are distinct, more standardized than those of contractors. Labor and cost control compare more closely with manufacturing operations. NISA welcomes the new closer affiliation with NECA and desires cooperation with its members in solving service shop problems. Major objectives of NISA are — effective local organizations, annual conventions for discussion of problems, interchange of price and method data; standardization and exchange of rebuilt equipment; certification of shops to raise standards of workmanship and ethics; coordination for the improvement of both industry and government relation. Mutuality of customer and labor interests should bring contractors and shops into close working harmony.

Wholesalers Help

BY
HARRY L. HARPER
Pacific Coast Manager Graybar Electric Co.

PROBLEMS of the wholesaler do not vary greatly with the years. But the need for cooperation with other branches of the industry continues and increases. The National Adequate Wiring Campaign offers great promise. The wholesaler has his part to play. The function of the wholesaler is to (1) warehouse stocks (2) maintain delivery service (3) operate a selling organization to promote markets and give service (4) distribute catalogs and (5) extend credit. Wholesalers are trying to cooperate with the other branches of the industry. But they must reckon with the law of the land and the law of economics. The depression showed both manufacturers and users there is no economical substitute for the official distributor. Not all buyers and sellers realize this. But out of cooperation is coming understanding of our mutuality of interests.

Fair Trading Policy

BY
RALPH M. WALKER
President
Walker Elec. Co.,
Chairman NECA
Distribution Com.

WE CANNOT eliminate all our troubles. But we can do a lot by being fair amongst ourselves. Our Chicago convention laid down the principle that the proper path for the distribution of electrical construction materials is from manufacturer to wholesaler to contractor to consumer.

We have adopted a pledge that the contractor is entitled to compensation if he—(1) creates demand by selling, (2) builds good will for particular products, (3) makes no substitution, where demand is for specific equipment, (4) supplies engineering experience, (5) guarantees successful operation of entire installation and (6) furnishes supervision and servicing.

Blame for the chaos that led to this pledge is shared by all branches of the industry. Contractors bought direct from manufacturers. Wholesalers sold industrial customers and the public. Manufacturers sold industrials direct. Each injured party made reprisals. The sin lay in that our misunderstandings were not handled in conferences. Instead we started wars. Of course the man who operates two kinds of business is not condemned if he operates each separately.

NECA attempted to cooperate with manufacturers, who maintain fair policies, by publishing a "white list". Such action by agreement, proved illegal and was discontinued. But by arousing a storm, it showed the power of united action. Legal action can now be applied to establishing a Fair Trading Policy. Our members, however, are not yet in accord, as to just what is desired.

All branches of our electrical industry now favor a solution of the problem. To play our part in it we must—

1—Agree among ourselves on the trading policy desired.
2—Increase our membership to embrace the majority of electrical contractors.
3—Agree in our own hearts to live up to our policy.
4—Be willing to work to win its support.
5—Have a spirit of tolerance and expect no miracle over night.
6—Present our code to the other branches of the industry and aid in the development of an Industry Code.

Meetings of the Electrical Industry Promotion Committee indicate desire in the other groups to cooperate. We can have a Fair Trading Policy, if we are able to work for it.

heard the story of the work that 71 astronomers are doing up there in the sky during the wee hours of peaceful slumber for the rest of us.

Next morning the ladies drove through the orange groves to the Mission Inn at Riverside, and lunched in the patio to the music of the fountain and the Spanish singers in the balconies above. That night there was a banquet at the Hotel Biltmore, with a spectacular floor show, which was followed by dancing. It was a gala affair that provided visitors with a sample of Hollywood night life.

Next morning the ladies slept and the men came late to meeting—and then it was all over. Everybody was tired but happy.

MCGRAW AWARD *being presented to George W. Patterson of Toronto (left) by Earl Whitehorne.*

The Convention Electric Show

"Electrical Exposition Extraordinary" was the name given the manufacturers' and distributors' exhibit. It flanked both aisles of the large entrance lobby and completely encircled the meeting hall of the convention.

Thirty-three exhibitors staged attractive displays of wiring materials, special wiring equipment and fittings, switches and panelboards, lighting fixtures, lamps and electrical heating apparatus. The two local utilities, the Southern California Edison Company and the Los Angeles Bureau of Power and Light, each presented interesting educational exhibits.

In the Edison Company space all of the special lighting test display boxes that were used at the Cleveland exposition last year were on display, with a center piece advocating Red Seal wiring. The three-part booth of the municipal bureau showed a replica of Boulder Dam and a demonstration of progress in office electrification. In an old dark wood panelled office of the early 1900 era was a combination carbon lamp—gas light center fixture with cords running around the room. Contrasted was a modern office, with high intensity lighting, electric office machinery in use, and air conditioning.

There were many moving displays. Lighting fixtures were connected and operating, telephone and sound equipment was working, circuit breakers and fuses were in action, with devices which served to illustrate their time delay and protection features.

Because the principals were present from some of the factories, whose products were on exhibit, the booths made a convenient meeting place between contractors from all parts of the country and these manufacturing executives. A number of products, just announced in advertisements to the trade, were shown for the first time. Contractors had an opportunity to discuss their use and their characteristics, with samples at hand.

The Exposition Extraordinary contributed sparkle and color to the convention. The displays were well designed and attractive.

PLEASURE PLOTTING *foursome (top) of the convention: Art Rowley, Herbert Evans, J. J. Newitt and Harry Bayers. Motor expert Frank Boyd of Oakland (left center), Bill Cyr editor-flashman, and William J. Wheeler, New York, president of NISA. Texas ladies enjoying friendly jibes with President Peak.*

Co-op Farm Wiring

By William T. Stuart
Middle West Editor

MONTHLY MEETINGS *are attended by the co-op wiremen where methods are discussed and individual problems are aired.*

A report on a visit to an Indiana Farm Cooperative and a day spent in in the country visiting wiring jobs with the Co-op inspector.

OUT through the Middle West an institution is growing. It is something new in the American scene. It is the farm co-operative. And right now it is disturbing the electrical contracting industry because it has taken over the job of wiring farms.

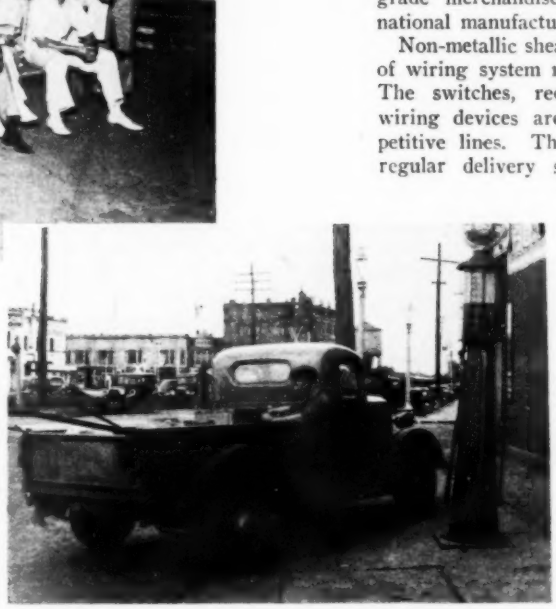
In the state of Indiana new rural line extensions have opened up a market for three million dollars worth of wiring. The co-ops are getting more than half of this business at the present time and are still growing. And Indiana is typical of many Mid-west states.

In Huntingdon, Indiana, opposite the Court House, is a two story brick building which houses the Farm Bureau store and offices. The Farm Bureau will buy and market a member's crops, or it will buy farm machinery or supplies on the open market and resell them to the farmer. To the member farmer, it is his purchasing and sales department.

The capital to operate the farm bureau store is set up by the farmers through membership fees and the purchase of 6 per cent preferred stock. The major point of distinction from other business houses, is that profits are distributed to the members on the basis of the amount of their purchases rather than on the amount of stock they hold.

About half of the Huntingdon store is devoted to the Rural Electric Store. Here all types of appliances are on display. Wiring materials and fixtures may be purchased by the farmer at approximately the same prices charged by the large mail order houses. The lines displayed are, in general, good, high grade merchandise from well known national manufacturers.

Non-metallic sheathed cable is the type of wiring system most commonly sold. The switches, receptacles and other wiring devices are the cheaper, competitive lines. The store maintains a regular delivery service for its customers, covering farms within a twenty mile radius. Thus the material supply for the co-operative wiring jobs is handled by an extension of the normal business machinery of the Farm Bureau.



MATERIALS ARE DELIVERED *to the farm jobs over a wide territory from the farm bureau store. Although purchased by the farmer, the wireman gets a small commission on the sale.*

In December of 1936, the county Rural Electric Membership Corporation asked James R. Van Pelt, an experienced electrician who has been working in the industry for over 40 years, to get together some farm boys and give them a course in wiring houses and barns. The call went out for students and 106 young men met to start

a series of lessons on wiring at the Bureau. This group was divided into three classes, meeting on alternate nights, until each group had received the full course of 11 lessons. Part of the practical training consisted in wiring the Electric Store.

At the conclusion of the series of school sessions, sixty of the original group had carried on and shown sufficient competence to be graduated farm wiremen. Twelve "free" jobs were then offered to the members of the co-op, one in each township, chosen by lot. The lucky winners could have their farms wired by the newly trained wiremen, under the supervision of their instructor, for only the cost of the materials used. The classes ganged up on these jobs and got some practical experience. When the jobs were finished the boys were rated as qualified farm wiremen and turned loose on their own farms and those of their neighbors.

These wiremen are now hired directly by the farmer at 45 cents an hour. The co-op does not quote contract prices. The farmer is urged to buy electrical materials from his co-op store, where he may also be advised on what wiremen are available to take care of his work.

Inspection is required on all farms connected with the R.E.M.C. lines before power will be connected. The statewide R.E.M.C., with headquarters in Indianapolis, has set up a minimum standard for farm wiring based upon the National Electric Code. Each county unit may in turn set up standards for a particular locality or line. In most cases, however, the state code is accepted as standard. Variations from the N.E.C. in the state code are in the direction of more rigid requirements; for instance, 60 ampere services and No. 12 wire for first floor and basement circuits are minimum standards. Grounding is especially emphasized as are low line losses in extensions to outbuildings.

Each county R.E.M.C. employs an inspector whose duties include some advisory supervision over the work as it is being installed. As inspections are made, a tag is affixed to the meter switch, indicating by the color whether the job is approved for service connection. An inspector from the State Fire Marshal's Office travels over the state giving advice and supervising the county inspections.

Average Costs

Today there are approximately 600 farms in Huntington County wired by the co-op, according to Marion Van Pelt, inspector for the county R.E.M.C. These jobs averaged about $2.50 an outlet for the wiring and the ordinary complete jobs run between $150 and $200. In many instances the farmers are wiring only their houses, with facilities available for future extensions to the outbuildings.

This will create a major inspection problem in time, reports George Morrow, State Electrical Inspector, but the rigid service provisions in the state code will prevent serious overloading. This phase of the farm wiring situation is now under study and some method will be devised to keep the future extensions under inspection. The jobs now being installed are well up to the average number of outlets for old house work in urban areas.

"IN CONFERENCE"—*George Morrow, State Electrical inspector, explains obscure code points and discusses inspection problems with County Inspector Marion Van Pelt.*

The co-op's most widely used wiring system is non-metallic sheathed cable. The wiremen were specifically trained to work with this type of material. I spent a day looking over their work and the jobs are well installed. There is a strong rivalry among the wiremen and they take a lot of pride in a good job. Plaster is cut and patched neatly, baseboards are replaced without a scratch, and circuits are laid out with great care. Blunders mean not

(*Continued on page* 89)

ECTOR'S GENERATOR, *mounted his car energizes home service re power connections are made.*

FARM LADS, *now wiremen Bonewitz and Schlegal, with County Inspector Marion Van Pelt.*

CO-OP LINE *from house to out-building. Wiremen are taking pride in rural electrification work.*

CIRCUITS BRANCH *from a cellar junction box to the outlets on the floor above. An example of the type of wiring system installed by the Indiana co-ops.*

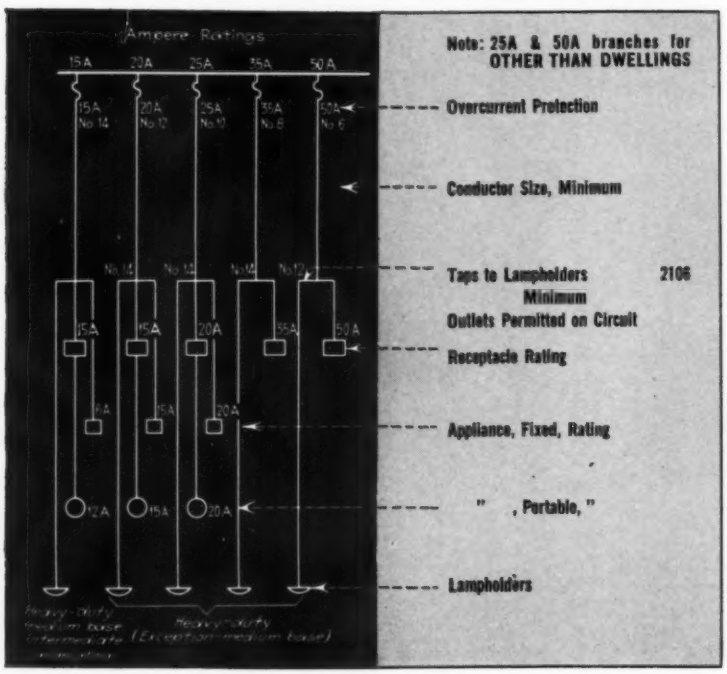
Know Your Code—III

By John M. Turnbull,
Service Engineer, United Electric Light Company, Springfield, Mass.

Everyday design and installation methods are affected by changes in the 1937 Code. Some of the more common examples now conclude this series.

TWO previous articles outlined the sweeping rearrangement of the 1937 National Electrical Code and depicted the logical sequence of rules. In working from this new Code, however, the contractor and inspector will find some revised rules that will have to be considered in doing electrical work in the future.

NEW CLASSIFICATION OF BRANCH CIRCUITS—(SECTION 2114)



Perhaps the most important of these revisions are those rules covering branch circuit classification and load calculation for both residential and commercial occupancies. These new requirements apply to the number and class of branch circuits required for each type of installation.

Branch circuit rules for residence wiring employ a new watts-per-square-foot requirement plus an allowance for appliances, while for other occupancies the branch circuits are now based on a definite ampere load per outlet. Under the new classifications of branch circuits, as illustrated elsewhere, it is apparent that the new rules will be helpful in avoiding overloaded circuits.

Feeder calculations have also been changed. For school and store lighting the demands have been increased to 3 watts per square foot while for range feeders the demand factors have been decreased somewhat.

This article presents only a few Code changes. It selects for discussion those changes which are considered most likely to affect the widest number of average installations. It is expected, of course, that opinions will differ as to which are the most commonly used Code rules and which should be discussed. But for those who wish to make a detailed study of all changes, the complete Code revisions are available in booklet form under the title "Analysis of 1937 Revision of National Electrical Code." This booklet has received wide circulation through its publishers, the National Electrical Manufacturers Association.

New Rules for Feeder Demand Values

LIGHTING FEEDERS for stores and schools increased to 3 watts per square foot.
See Table No. 17 in Chapter 9.

RANGE FEEDERS—Demand factors for
1650-3500 watts—not changed
over 3500 watts—reduced
See Table No. 18 in Chapter 9.

SOME NEW CODE RULES

New Rules For Residence Branch Circuits

LOAD DETERMINATION
—Sect. 2107a

2 watts per square foot, plus
500 watts for kitchen
500 watts for breakfast and dining rooms
500 watts for laundry tub receptacle

See Example No. 1 in Chapter 9.

Dwelling Having Area of 2500 Sq. Ft.

Lighing Load 2500 x 2.....	5000	Watts
Appliance Load, Kitchen	500	Watts
Dining Room..	500	Watts
Laundry Tub...	500	Watts
Total	6500	Watts

NUMBER OF BRANCH CIRCUITS
—Sect. 2108

Determined by load as computed above, and by ampere rating of branch circuits to be used.

See Example No. 1 in Chapter 9.

6500 + 15 = 57 amp., or
four 15-amp., 2-wire branch circuits
6500 + 230 = 29 amp., or
two 15-amp., 3-wire branch circuits

NUMBER OF OUTLETS PER CIRCUIT

Former 12-outlet-per-circuit rule abandoned.

New Rules for Branch Circuits Other than Residence Wiring

LOAD DETERMINATION
—Sect. 2107b

1½ amp. for each medium-base lampholder
1½ amp. for each receptacle
5— amp. for each heavy-duty lampholder
Plus

Show window lampholders, for which specific load is to be estimated for each outlet.

NUMBER OF BRANCH CIRCUITS
—Sect. 2108

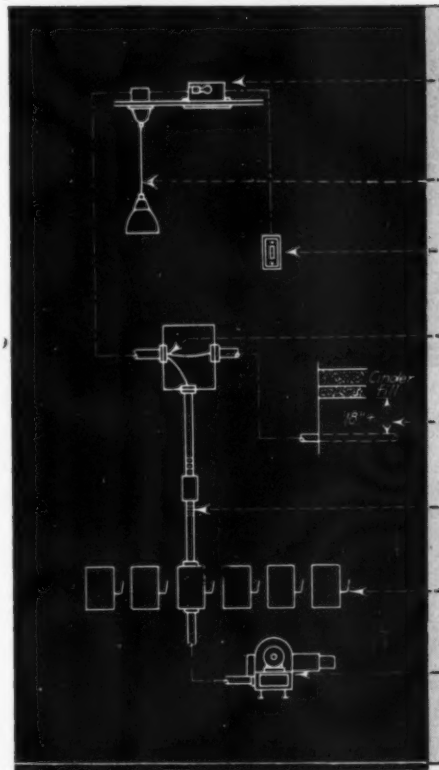
Determined by load as computed above, and by ampere rating of branch circuits to be used.

Store containing:

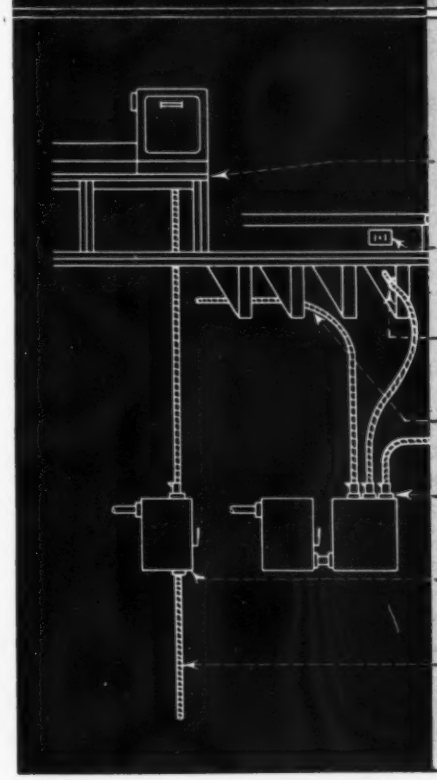
10 heavy-duty lampholders
20 medium-base lampholders and receptacles
28 medium-base lampholders for show windows

Type Load	Ampere Load	Number of Circuits
Heavy-duty lampholders	10 x 5 = 50	2, 25-amp. 2-wire or 1, 25-amp. 3-wire
Medium-base lampholders and receptacles.....	20 x 12 = 30	2, 15-amp. 2-wire or 1, 15-amp. 3-wire
Show window lampholders	28 x 2 = 56	4, 15-amp. 2-wire or 2, 15-amp. 3-wire

See example No. 2 in chapter 9.



	1937 Code Reference
FIXTURES—FLUSH & RECESSED—Shall not subject adjacent combustible material to temperature above 194°F.	4123
SHOW WINDOW CORDS—Type "S" cord to be used	4004
SNAP SWITCH RATING—"T" type approved for full rating on tungsten lamp loads	3814
INSULATION AT BUSHING—No. 1 or larger deflected more than 30° requires insulated bushing	3012b
CONDUIT IN CINDER FILL—Steel conduit at least 18 inches under cinder fill	3464
RUNNING THREAD—Shall not be used	3470
SERVICE SWITCH—6 switches or circuit breakers may be used without a main	2351a
MAIN SERVICE FUSES—6 sets may serve	2371a4
OIL BURNERS—Controls considered protection for motors 1/8 to 1 h.p.	4322c3



	1937 Code Reference Chapter 9 Table 18
RANGE FEEDER DEMAND FACTORS 1650—3500 watts—no change over 3500 " —reduced	
RECEPTACLE SPACING IN RESIDENCES—No point on wall to be more than 10 ft. from an outlet.	2110
ARMORED CABLE	Article 334
Staples not to injure cable	3343
Running board not required where supported at each joist, and not subject to injury	3344c
Insulating bushing not required with lead-covered cable if sheath is visible for inspection	3346
NUMBER OF SERVICES—Additional service allowed in single occupancy for different class of use	2302c
NO. 6 GROUNDING CONDUCTOR—May be used without metal covering where stapled to building and free from injury	2591c

SEALED OFF *to prevent gas circulation, this group of high-up feeder conduits with inverted sealing fittings, presents an example of problems that confront the estimator.*

Estimating Explosion-Proof

The concluding article of a series dealing with labor costs for installing wiring in hazardous locations. Previous articles appeared in July and September, 1937.

THE major operations involved in explosion proof wiring were covered in the previous articles of this series. There still remain the factors of equipment handling, erecting, connecting and sealing.

TABLE NO. 8—APPROXIMATE WEIGHTS OF HAZARDOUS-LOCATION EQUIPMENT

	Approximate Weight, Lbs.
Panelboards	
4-circuit	100
6-circuit	140
8-circuit	180
12-circuit	300
16-circuit	360
Circuit Breakers	
50-amp.	50
100-amp.	170
225-amp.	200
Motor Starters	
25-amp.	40
50-amp.	100
100-amp.	200
Reversing Starters	
25-amp.	75
50-amp.	160
100-amp.	300
Oil-Immersed Starters	
25-amp.	50
50-amp	125
100-amp.	200
Type A Ext. Oper. Switches	
30-amp.	30
60-amp.	35
100-amp.	50
200-amp.	90
Double-Throw Ext. Oper. Switches	
30-amp.	50
60-amp.	50
100-amp.	75
200-amp.	165

For installing heavy equipment, such as panelboards, motor starters and other explosion-proof enclosures labor costs must be carefully estimated. Use approximate weights, given in Table 8.

Having checked up on the weight of large units of miscellaneous equipment, the cost for installation may be ascertained by using Table 9. The labor values given in this table are based on handling more or less special and strange apparatus, which is being redesigned or changed from time to time. Heavy cast iron covers must be removed from such enclosures, gaskets and bolts kept in a safe place, and all put back after final connections and tests have been made. In some types of equipment there is also oil to be handled for the reservoirs. Note that Table 9 does not include the actual connecting of wires and cables to lugs or terminals.

After all wire and equipment is installed, the job is ready for connecting up. Table 10 provides labor units for making both soldered or solderless connections of various ampere ratings. The units are based on such work being more difficult to perform in explosion-proof enclosures and fittings, due to the inaccessibility of terminals. Special caution must be observed by the estimator, if soldered connections are required in explosive areas of industries where the work is to be done while the plant is operating. Here the use of flameless soldering methods may prove rather cumbersome in cramped quarters.

Table 11 provides units for caulking and sealing explosion-proof fittings under several conditions. While smaller jobs may not warrant a breakdown of such operations, according to height above the floor, particular attention should be given to isolated fittings which occur on high-bay ceilings. If conduits are run in groups, and the sealing fittings are banked in a similar and accessible manner, it may be possible to make substantial reductions for

TABLE NO. 9—HANDLING UNCRATING, ASSEMBLING AND MOUNTING MISCELLANEOUS EQUIPMENT, MAN-HOURS PER UNIT

Equipment Weight - lbs.	Wall Mountings	Ceiling Supported
up to 50 lbs.	1.5	2.5
51 to 100 lbs.	2.2	3.0
101 to 150 lbs.	3.5	5.0
151 to 200 lbs.	4.6	6.5
201 to 400 lbs.	6.5	8.4
401 to 600 lbs.	7.8	11.0
601 to 800 lbs.	12.0	17.6
801 to 1000 lbs.	17.0	23.0

Note: This table applies to starters, safety switches, panels, large junction boxes, transformers, circuit breakers and cases, and other heavy explosion proof enclosures except motors. Connecting labor not included. Labor for fastenings, such as expansion bolt hole drilling not included.

Wiring

III

By Frank J. Seiler

Associate Editor,

TABLE NO. 10—WIRE AND CABLE CONNECTIONS FOR EXPLOSION-PROOF EQUIPMENT

	Man-hours per Terminal	
	Soldered	Solderless
No. 14 and 12	....	.07
No. 10	.20	.09
8	.22	.11
6	.31	.22
4	.33	.25
No. 2 and 1	.39	.32
No. 0 to 3/0	.46	.39
No. 4/0 to 250M	.66	.55
300,000 c.m.	.69	.60
400,000 c.m.	.72	.66
500,000 c.m.	.77	.72
750,000 c.m.	1.05	.90
1,000,000 c.m.	1.22	1.10

Note: This table applies to connections made in panelboards, safety switches, motor terminal housings, starters and other explosion-proof enclosures.
Equipment mounting labor not included. Add additional labor for tests and checking diagrams.

TABLE NO. 11—LABOR FOR INSTALLING SEALING COMPOUND IN FITTINGS—MAN-HOUR FOR FITTINGS

½-in. to 1-in. fittings	.25
1¼-in. to 2-in. fittings	.40
2½-in. to 4-in. fittings	.55

Note: For fittings located high on walls or ceilings add:
On Walls, 8 to 16 ft. above floor, add 50% to above units.
On Walls, 17 ft. or more above floor, add not less than 100%.
On Ceilings, 12 ft. above floor, add 50% to above units.
On Ceilings, over 12 ft. above floor, add not less than 100%.

the sealing times as given. However, if sealing must be done singly at scattered locations, much of the high-up work will require a team of men.

For motor handling and setting, Table 12 can only serve as a rough guide. It is necessary first to determine approximate weights, because several motors of different horse-power ratings may weigh almost the same. Explosion-proof motors being considerably heavier, and in appearance clumsier to handle, some additional labor allowances were made in this table.

The preparation of estimates for wiring in hazardous locations is a conventional take-off procedure. However, the twelve tables that comprise this series serve to point out a need for preparing carefully detailed estimate sheets. If every operation is recorded in a careful manner, it is then possible for sane and safe labor values to be assigned.

Every contractor has an opportunity, as jobs of this type are installed, to acquire valuable data to build upon the foregoing tables. Furthermore, the units given herein may be gradually adjusted to meet prevailing conditions in certain types of industries and structures.

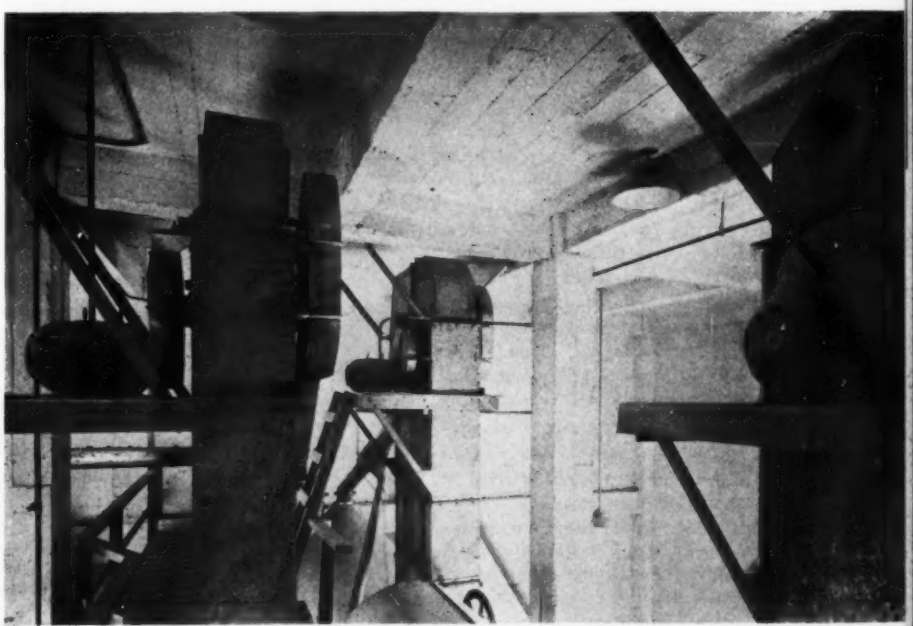
Many variables will be found for which adjustments or allowances must be made in the estimate. This is especially important for jobs that must be done while a plant is kept running, also, careful consideration should always be given to unfavorable working conditions and to special precautions which must often be observed.

Hazardous locations demand exacting workmanship, which requires proper labor values in the original estimate. With these tables as a guide, the contractor need no longer make blind guesses when the next difficult explosion-proof job comes along. Study the job, and then apply sound labor units to each operation. Good estimates prevent labor losses and conserve estimated profits.

TABLE NO. 12—LABOR FOR ROLLING AND PLACING EXPLOSION-PROOF MOTORS

Approximate Weights	Man-hours Each On Floor	On Walls or Machine	Or Ceiling
Below 200 lbs.	5.0	6.75	8.0
201 to 400 lbs.	7.0	10.0	12.0
401 to 600 lbs.	12.0	16.0	20.0
601 to 800 lbs.	15.0	21.0	27.0
801 to 1200 lbs.	20.0	30.0	34.0
1201 to 1500 lbs.	26.0	32.0	....
1501 to 2000 lbs.	30.0	39.0	....
2001 to 3000 lbs.	38.0	49.0	....
3001 to 4000 lbs.	69.0	....	....

Note: Labor for installing fastenings or supports not included.
Hoisting into buildings or special towers, and connecting additional.



MOTOR HANDLING *and alignment costs vary according to weight, accessibility and nature of drive. Here are some totally enclosed, fan-cooled units in a grain elevator.*

They Say Air Conditioning is Easy

By LAURENCE WRAY
Managing Editor, Electrical Merchandising

Observations on a recent trip through the south show that many electrical contractors are profitably selling air conditioning. Why not?

MANY people have thought that as the air conditioning business became important from the standpoint of volume and profit, its distribution would be in the hands of the heating and ventilating fraternity. And what these estimable gentlemen could not take care of was expected to gravitate, as if by some process of osmosis, into the eager hands of the bathroom-fitting trade.

It was not difficult to see how such a notion got around. There is a fairly close relation between air conditioning equipment and heating systems, duct and ventilating systems and automatic controls. It's a little harder to see the tie-up between the bathroom-and-kitchen-sink-johnnies, unless there was something awe-inspiring about the sight of a plumber's tool-kit. Hell! We got tool-kits! Anyway, the misconception exists, promoted by the fellows with the thick glasses, who figure which way the cat is going to jump.

Well, air conditioning is not something that exists in the future any more. Its volume and its profit are actualities today. So much so that in some thriving southeastern and southwestern cities there is something perilously like saturation in the major installations. After all, there are only so many hotels, department stores, movie houses, bars and better class restaurants. Utility companies that have been forced to add to transformer capacity and build sub-stations to handle the vast increase in load know it. Manufacturers and their distributors who have been concentrating on this rich market know it. And the upshot of it all is that they are turning their attention, in increasing numbers to that well-known Goliath of all markets—the home.

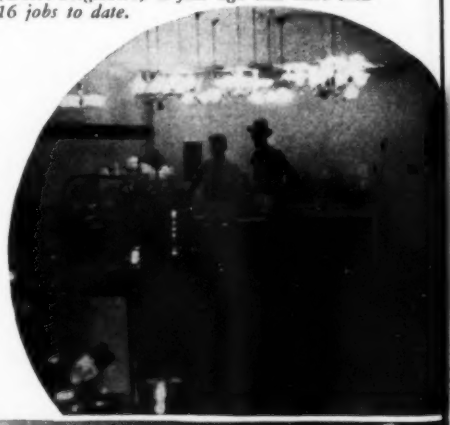
A look around at the distributing agencies that are responsible for a good share of the present installations reveals the surprising fact that, far from dominating air conditioning, the heating and ventilating people are only occasional factors. A recent visit to Birmingham, Alabama, showed the breakdown to be about as follows: wiring contractor, appliance distributor, hardware and electrical supply house, jeweler, **commercial refrigeration** distributors, heating and ventilating house

(Continued on Page 59)

BAILEY'S, *a typical electrical contracting company, is the Carrier air conditioning distributor in Charleston, S. C.*

IN SAVANNAH, *the Carrier distributor is the Industrial Electric Company, contractors responsible for some of the biggest A-C jobs in the city.*

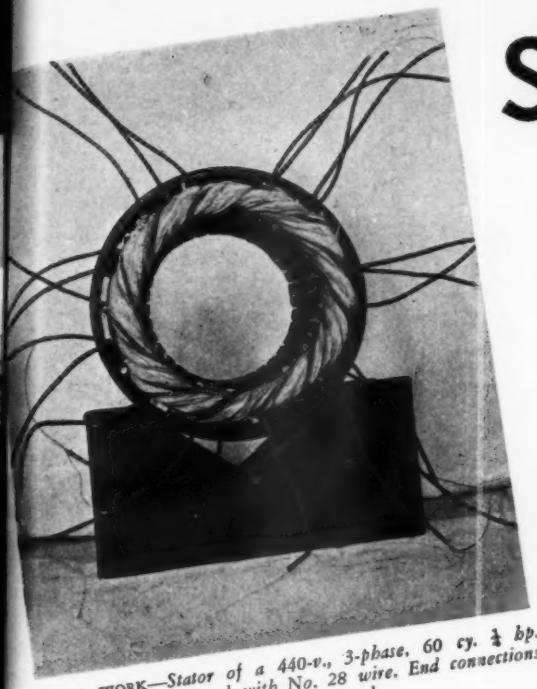
CHISHOLM'S, *veteran electrical contractors of Tupelo, Miss., took on air conditioning (Delco-Frigidaire) a year ago and have sold 16 jobs to date.*



IN THE SOUTH, *attic ventilation is gaining increasing popularity as an economical, efficient means of residential comfort cooling.*

Some Points About Windings

By P. H. Grogan,
General Cable Corporation, Rome, N. Y.



GOOD WORK—*Stator of a 440-v., 3-phase, 60 cy. ¼ hp. motor, being rewound with No. 28 wire. End connections are not yet completed*

HALF DONE—*Stator of a 440-v., 3-ph., 60 cy., 25 hp. motor rewound with No. 10 wire. End connections completed, but third phase wire lead not in place*

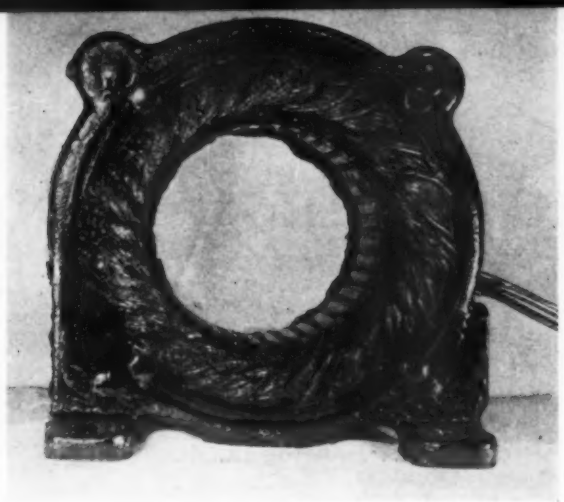
To operate with a reasonable stock that fulfills a maximum range of motor repair work, the motor shop should keep informed about trends in the use of magnet wire.

IN rewinding motors, it is common practice to replace the same type of insulation, originally used by the motor manufacturer. During the past few years, however, round single cotton covered enameled wire has often been substituted for round double cotton covered because the latter has a better space factor and higher dielectric strength. These advantages materially reduce the number of short circuited turns in the finished windings.

Another frequent instance of substitution is the replacement of double silk covered with single silk covered enamel. In some cases, especially in small size fractional horsepower motors, it may be necessary to use a greater amount of slot insulation than was originally used. If the original type winding were replaced, crowding would result. In such instance "Double Enamel" wire, which is essentially a plain enameled wire having a double thickness of insulation, can be used quite satisfactorily. The double enamel film produces an insulation which has a very high dielectric strength. Also the space factor is much improved.

It is also advisable to use a double enameled wire to replace a plain standard enameled wire, where it has been found that failure has been caused by abrasion. Since the insulation used is about twice as thick as that originally used, special precautions must be taken to prevent overcrowding of the windings. Otherwise trouble may develop.

In replacing windings, it is necessary to check the old windings with the name plate data of the machine, and determine if any substitutions have been made during previous repair work. Since it is necessary to secure the correct copper wire gauge, care must be taken in removing the old coils from the machine. Any unnecessary strain in removing the windings from the slots is likely to pull down the diameter of the copper, with a subsequent false reading of the gauge of the wire. Wire gauge should be checked carefully, since there may have been a previous error made in selection.



SHIP SHAPE—*Stator of a 440-v., 3-ph., 60 cy., 2hp. motor rewound with No. 19 A.W.G., s.c.e. wire. End connections and leads completed, winding impregnated and baked*

When a machine is received for repair, the number of shorted windings is carefully checked. The question often arises as to whether only the defective windings should be replaced and the old coils reinsulated, or whether the whole machine should be rewound. If 20 to 30 percent of the windings are defective it is considered uneconomical to replace only the defective windings; rather, the whole set of windings are replaced. However, if the percentage is quite low, it indicates that the failure has not been due to a high temperature condition throughout the machine. A satisfactory repair can often be made by replacing the defective windings, and, if necessary, reinsulating the old coils.

Handling Heat Resistant Insulation

Ordinarily, heat resistant insulation such as asbestos is furnished on magnet wire with a tough, hard, smooth finish which is not lubricated. The handling of this type of insulated magnet wire in general, does not require any special precautions. Where it is necessary to wind a tight, form-wound coil, tension blocks are used on the wire. In some cases with a high winding speed, it has been found that excessive tensions on this block, will generate heat. If the winding process is stopped for any reason, this heat is likely to cause the wire to set in the tension blocks, so that when the winding process is resumed, there is a possibility of stripping off the insulation from the wire. This condition can be overcome by regulating the tensions used, and by lubricating the surface of the tension block.

As to Stocks

It is good practice for the average repair shop to keep a full stock of square double cotton covered wire. A record should be made of the most common sizes of rectangular double cotton covered wire used during the previous year, and an attempt made to keep a minimum stock of such wire. When there is a convenient source of supply, it is more economical to order the various sizes of rectangular double cotton covered as needed. In some cases, especially for emergency jobs, a number of double cotton covered squares may be combined, in order to make up an equivalent rectangular wire which is being replaced. This method also has the advantage of obtaining a conductor which is more flexible and easier to wind than an equivalent size of solid rectangular.

Where an especially large size of rectangular has to be replaced, and the shop equipment is not adapted to the proper winding of such a size, the practice exists of ordering two or three, or even four, bare copper square wires laid up parallel with a double cotton cover applied overall. This practice is more economical than laying up a number of double cotton covered squares, since the coverings on each individual square are eliminated and an overall covering is supplied.

Single cotton covered round enameled stock should be carried from sizes No. 10 to No. 30. Plain enameled wire sizes No. 17 to No. 38 will normally take care of all requirements. The amount of silk covered enameled wire needed is small and the sizes from No. 30 to No. 38 should be adequate. As far as asbestos insulated magnet wire is concerned, No. 11 round and No. 8 square are the more popular sizes.

The American Institute of Electrical Engineers groups conductor insulation into three classes, O, A, and B. Definition of these classes and some typical examples of magnet wire falling into these groupings are:

Class O insulation consists of cotton, silk, paper and similar organic materials when neither impregnated nor immersed in oil.

Examples: Single or double cotton covered, single or double silk covered and plain paper insulated.

Class A insulation consists of cotton, silk, paper and similar organic materials when impregnated or immersed in oil; also enamel as applied to conductors.

Examples: Plain enameled, single or double cotton covered enameled, single or double silk covered enameled, paper covered enameled, treated cotton covered and treated paper covered.

Class B insulation consists of mica and asbestos and similar inorganic materials in built-up form combined with binding substances. But where Class A material is used in small quantities in conjunction with Class B insulation, for structural purposes only, the combined materials may be considered as Class B; provided the electrical and mechanical properties of the insulated winding are not impaired by the application of the temperature permitted for class B material.

Example: Asbestos insulated.

These three general classifications include all of the types of magnet wire used in d.c. armatures, a.c. stators, and slip ring rotor coils, and a.c. and d.c. field coils. The selection of the proper class of insulation will depend on the temperature rating of the motor. The use of a particular insulation, under the class decided upon, will depend upon space limitations and service conditions. For instance, in armature windings for normal temperature operation, class O or A insulated wire is used.

Armatures for large size motors requiring large copper conductors such as square or rectangular are normally double cotton covered to better withstand the abrasion and handling necessary. For medium size motors, single cotton enameled has been found quite satisfactory, and for fractional horsepower motors, such types as plain enameled, double enameled, silk covered and silk covered enameled are used. For high temperature ratings, asbestos covered types replace those listed above.

Types and Standards

The three most commonly used types of magnet wire in the motor repair shop are double cotton covered, single cotton enameled and plain enameled. In January 1936, N.E.M.A. issued publication No. 36-34 covering standards for the above mentioned types, and in addition, silk covered magnet wire. Recently a similar set of standards has been issued by the American Standards Association.

Since this standardization involves the setting up of maximum and minimum overall diameters and physical and electrical tests, it should prove to be of advantage to the user. The maximum overall diameter limit should give assurance against overcrowding of the windings. The minimum limit provides for adequate spacing of the turns. Finally, the test requirements have been designed to insure an adequate magnet wire, from the standpoint of physical and electrical characteristics.

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PRESENT 30 AMP. E. M. T. (CONDUIT) METHODS

	Quant.	Description	Unit Cost	Net Cost
(1)	1	C-H 4331H7 SERVICE SWITCH	$4.00 ea.	$4.00*
(2)	2	30 amp. plug fuses	.04 ea.	.08
(3)	4	15 amp. plug fuses	.04 ea.	.16
(4)	11 ft.	¾" E.M.T.	7.05 C	.78
(5)	36 ft.	#8 R. C. Wire	27.30 M	.98
(6)	18 ft.	#8 Bare Wire	21.80 M	.39
(7)	1	¾" Serv. head	.43 ea.	.43
(8)	1	¾" Serv. ell	.42 ea.	.42
(9)	3	¾" E.M.T. Conn.	10.20 C	.31
(10)	1	Grd. Clamp	.32 ea.	.32
(11)		Misc., Lock Nuts, Bushings, etc.	.80	.80
			TOTAL	$8.67

*Average contractor cost

NEW 60 AMP. E. M. T. (CONDUIT) METHODS

	Quant.	Description	Unit Cost	Net Cost
(1)	1	4334H17 C-H SWITCH	$4.38	$4.38*
(2)	11 ft.	1" E.M.T.	10.13 C	1.11
(3)	36 ft.	#6 R. C. Wire	46.40 M	1.67
(4)	18 ft.	#8 Bare Wire	21.80 M	.39
(5)	1	1" Service head	.56 ea.	.56
(6)	1	1" Service ell	.56 ea.	.56
(7)	3	1" E.M.T. Conn.	17.35 C	.52
(8)	1	Grd. Clamp	.32 ea.	.32
(9)	4	15 Amp. Plug fuses	.04 ea.	.16
(10)		Misc., Lock Nuts, Bushings, etc.	.90	.90
			TOTAL	$10.57

*Average contractor cost

Perfectly Timed to gear in with the new 1937 N.E.C., Bull. 4334H17 is the greatest single contribution to service switch design and to improved wiring standards. This advanced type switch has the following outstanding features: No main fuses; unconcealed toggle switch operated from outside the case; silver-to-silver contacts; compact design, universal mounting, all installation and service operations from the front permitting gang mounting; modern styling; mar proof finish; etc.; etc.; etc. Feature and push Bull. 4334H17 for lower costs, greater sales, decreased servicing, tremendous customer satisfaction. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1306 St. Paul Ave., Milwaukee, Wis.

Meets the NEW 1937 National Electric Code
(see article 2371-a-4)

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SERVICE EQUIPMENT
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Total average cost $8.21
New 60 Amp. method
Total average cost $9.10

Editorials

Earl Whitehorne, Editor

And You Are Responsible

Ever since men have lived together, there has been need for law and order. It is still so. And the electrical contractor is really entitled to small sympathy over the mess that he is in. He is trying to live and work in a trade without laws. It can't be done—not happily.

The fact that anybody can get into the business and wire buildings for cost-of-materials and a day's wage has wrought havoc with the qualified contractor. But it is his own fault. He did nothing to prevent it. And so practically the whole field of house-wiring has been lost to him. And much other work is in the hands of men who lack both the knowledge and responsibility that electrical construction requires. So the trade is demoralized and the public is ill served.

But the condition can be corrected. There is still time. It can be improved in the only way that any troubles in the relationships of men can be cured—by self government. That means by organization, education and discipline among the contractors of each community.

The difficulty so far has been that capable, qualified contractors have not taken upon themselves their natural responsibility for self-government. They have side-stepped the burden of leadership and just let things go, and they have paid the price in loss of both money and peace of mind. There will be no relief until they face their inescapable duty to establish and maintain order in their trade.

Why don't we look this in the face? Every town must have a governing board. Every local contracting industry needs a governing council, too. A group of men, backed by the supporting opinion of the electrical community must see that all members of the trade know their costs and obey the simple economic rules that must be followed in any healthy business.

The strong men must lead. And they will be richly repaid out of the improved prosperity that all will enjoy.

How Cheap is the Cheapest?

This is the fortieth anniversary of the National Electrical Code. In this period much has been said about minimum standards. Some claim that restrictive rules have limited wiring systems to levels of inadequacy. Which brings up the perennial challenge—whether cheaper methods of wiring provide an answer. Is another major operation on the Code worth the risk of losing all the worthwhile gains made thus far?

Apparently the inspector holds no such views. Rather he looks toward standardization of materials as a safer pathway to reasonable wiring economies in the future. This would permit present standards to remain intact except for gradual revisions in keeping with real progress.

L. W. Going, president of IAEI, presented a paper before the sectional conventions of electrical inspectors, in which this vital subject was thoroughly discussed. He cites the costs of approved wiring as compared with the economies that might be derived from the cheapest imaginable type of wiring. A cheap method makes so little actual saving over present approved methods, he says, that the proposed major operation appears unjustified.

Mr. Going gives wiring costs for a typical six-room residence in Portland, Ore. It figures $130 in all, of which $41 covers parts that would be affected if low-cost materials and methods were developed and permissible. The cheapest imaginable way to wire for lighting and appliance circuits was assumed to be ordinary rubber covered conductors run without additional protection, through holes in timbers, and stapled directly to the surface of the timbers. This kind of job in lieu of armored cable for circuits and electrical metallic tubing to the range, would save the sum of $16, or about 12% of the total wiring cost.

In the face of such figures, this inspector makes two interesting suggestions—1. That a good wiring system, which costs but $16 more than a doubtful one, serves as cheap insurance for dependable delivery of electric service to a $500 to $800 investment in appliances and fixtures; 2. That $130 spent for good wiring represents but 22 per cent of the amount paid for energy in ten years in the average 6-room Portland home. If the wiring is reduced by $16, this saving would represent only 2.7 per cent of the ten-year energy cost.

Make It Easy To Buy

It costs seven dollars a month to borrow a thousand dollars at the bank and pay it off in eighteen years. During that period the monthly amount paid for interest dwindles from $4.17 to nothing and the monthly credit to the principal increases from $2.83 to $6.96. And that is the way people pay off modern mortgages. It is the way they should buy full comfort wiring, added to the mortgage on new houses or on a separate contract for old homes modernized.

The banks like to loan money that way. It is their business. In every city, therefore, facilities for buying wiring on this easy payment plan should be made available and advertised, so that everybody knows about it. And it can be arranged in every city, either through the local banks or a finance company or through cooperation between them and the power company. In enough cases to prove that it is sound, utility companies have guaranteed the accounts and brought the rates down low. Losses are negligible—and, of course, covered by the rate.

Sit down some day and figure out how many houses there are in your locality and ask yourself how you would like to help modernize the wiring in say ten per cent of them in the next six months. Then show the story to your banker and have him discuss it with the president of the power company. And the first thing you know it will be easy to buy and there'll be a lot of profitable house and store wiring going in.

Government Spurs Inspection

Inspectors were surprised when George D. Munger of REA, appeared before the recent Hartford convention, and said that farm wiring was now being inspected in some 21 states. Since the electrical industry is still in a state of indifference about farm inspections, this announcement gives timely warning.

Electrical men have a sorry record of haggling over minor details of state electrical legislation. But REA couldn't wait. So today in 21 states, farm wiring is inspected before being connected to REA-financed lines. The inspection procedure varies according to the facilities at hand. Deputy fire marshals, rating bureau engineers, or such local inspectors as were available are being used.

But farmsteads are now reasonably assured of electrical safety and farmers are beginning to appreciate proper electrical installation methods. The big task that remains is to educate them to higher adequacy standards. That is Mr. Munger's job—and he saw the inspection problem as a vital factor.

Here is something for our viewers—with alarm. Have electrical inspectors lost prestige by this emergency set-up of REA? Are future rural electrical inspections, and standards for all rural wiring to rest in the hands of federal agencies? Or will our industry stand up and cheer for a tough job well done and throw its full support to the permanent solution of adequate inspection for both rural and urban communities.

Men like George Munger, thinking in terms of electrical safety and adequacy, will welcome a cooperative industry attitude. Let's make the most of farm inspections and help build a great future market.

Back Talk

Refrigeration Service A—kin

To The Editor:—To my mind your editorial "No Chocolate Sauce" covers our field. There are a lot of things in common between the electrical contractor and the refrigerating engineer and there should be a closer connection between the two.

Beginning November 3rd in Chicago at the Stevens Hotel we hold the fourth convention of the Refrigeration Service Engineer's Society. The Society was formed in 1933 with only a few members. Now there are Local Chapters in over 26 cities and the membership is growing fast. It is strictly an educational institution and holds its Annual Convention at the same place and time as the Refrigeration Jobbers and the Refrigeration Parts Manufacturers. So there are really three separate Conventions meeting in Chicago. The first convention was held in Chicago in 1934 without any exhibitors. In 1935 the Convention was in Detroit with 32, in 1936 the convention was in Memphis with 44, now again in Chicago we expect 80 exhibitors.

We want to establish better co-ordination between the allied trades and to better conditions in our fields of endeavor.

W. Hall Moss,
1st Vice President,
Refrigeration Service
Engineers Society

Congratulations and good luck for your meeting. Sorry your letter came too late to list your convention in our October issue.

We Need Public Interest

To The Editor:—Somewhere in your series of articles mention was made of the lack of demand for better wiring. Laws, rules, good contractors and fine electricians all are terribly handicapped without favorable interest of the public. This thing seems to be quite overlooked or under-estimated by so many who could do so much.

Not much seems to be done to interpret this electrical language. Nobody makes any particular sense out of the rate, all the "gadgets" are marked in amps, watts, cycles and such. Then the approval of the Laboratory is indicated by somebody's catalog number. It would take an optimist to figure healthy demand out of that puzzle.

I am satisfied that there is too much confusion to expect an average home owner to voluntarily ponder the advantages and disadvantages of methods, systems and quantities. I do believe that the whole crowd, all the way from American Standards Association to the electrician's flunkie, would rank a bit higher, if honest effort was made to talk the language of the man who pays the bill.

The one group that could do more than any other is the contractor. He is the purchasing agent and best informed as to what is needed. He has the power to act and demand action on the part of others. Also he is the most independent man in the whole industry. Here, we have the non-tamperable fuse. It was in the air for several years. The public was deprived of its protection and its ability to show up wiring conditions, and maybe for good reasons. I know that the contractors could have had it in thirty days if they had demanded it.

I know a small contractor group that brought pressure to bear for the non-acceptance of the unlabeled lighting fixture. In a small way, they collected evidences of improper manufacturer practices relative to abuses of the "UL" marker. Without any particular noise, the business was started away from re-examination and toward something that could be read and understood by the purchasing public. My opinion is that a lot could be done in many directions to lift a perfectly normal business out of much unnecessary mystery by relatively small effort by the proper group.

The same public that has loaded up the auto dealers with junk automobiles are buying inadequate and improper wiring. In all probability they are doing the best they know in each instance, but if this is correct, there is a loose screw in the machinery.

C. S. Whitaker, City Electrician
Durham, North Carolina

Interesting comment, Mr. Whitaker, and you are right. The contractor is the big man and does not realize it. Some day he will find it out and a lot of things that now plague the industry will be corrected.

Those Grounded Tools

To The Editor:—At the meeting yesterday of the Electric Tool Institute we discussed your editorial. Practically all the members present reported that they furnish three-conductor cords to make it possible for the user to make a ground connection. Some attach a small tag giving directions for making a ground connection.

It is going to take a long time before users will install three-pole receptacles, so it is a question of proper education. For a large percentage of electric tools are operated from an electric light socket where it is not practical to have a three-conductor receptacle. So the building trade should be the first to be educated to ground electric tools, because in so many cases they use tools under conditions set forth in your editorial.

Please bring out the point that where a manufacturer does not have a tag, but still furnishes three-conductor cords, the little red conductor that sticks out above the attachment plug is for grounding purposes.

R. Kennedy Hanson,
Commissioner,
Electric Tool Institute,
Pittsburgh

Good news. But that red tag should tell them not only how to ground but that they must ground—and why. Make it sell the idea!

WIRING Methods

PROTECTED TRACINGS

Blue prints can usually be replaced, but if original tracings are destroyed, a big job may need to be done over. Construction jobs rarely have fireproof safes or cabinets, but here is an inexpensive idea that ranks next best.

J. P. Warner, electrical engineer for the Mellon Institute of Industrial Research used a 6-ft. length of 4-in. conduit as a fire-resistive storage tube for the many cloth tracings of the electrical layout. A threaded pipe cap closed each end of the pipe. The tracings were thus reasonably safe from fire, and being out of the way, did not become mussed up on busy work tables in the construction office.

SAFE FROM FIRE—Length of capped conduit provides inexpensive on-the-job storage for important tracings.

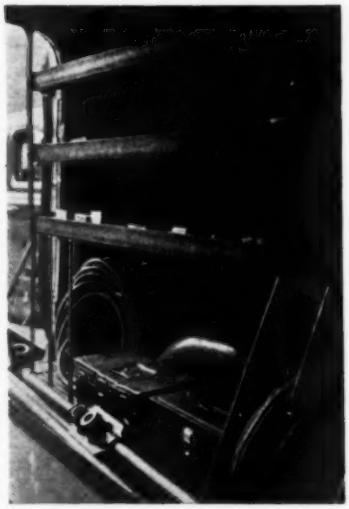
NEW TRUCK ELIMINATES SEARCHING

A new service truck designed for orderly carrying of material is saving a lot of workman's time for the Sturgeon Electric Company, Denver. The usual service truck, festooned with coils of wire and ladders, and its rear and a conglomeration of tools and materials has been replaced by a new truck with provisions for carrying everything needed for the job. This good planning has increased efficiency 50 per cent on small jobs.

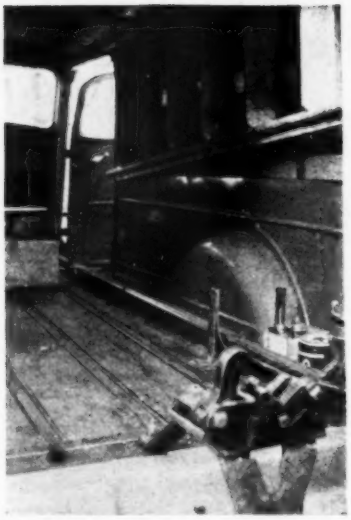
PRESTIGE—This Sturgeon service truck saves time on the job and builds good will in Denver.

Three advantages are incorporated in the new truck—1. Materials are in order; 2. Materials and tools are protected from the weather; 3. Better service builds prestige with customers.

Along one side of the interior are twelve bins for small stuff. Below the bins are stalls for wire. The opposite side of the truck carries an eight-foot ladder and an assortment of conduit. A longer ladder may be carried by binding the rear doors open against the protruding end. When the truck is loaded, it leaves a center aisle of good width.



CONVENIENCE—Materials are placed according to the frequency of their use —BX cable near the door in the rear.



ORDER—An eight foot ladder is carried on this side above lengths of conduit. The size is a convenient feature.

There is also a vise that may be quickly set up in the rear. This vise is fitted with two pieces of strap iron, one slips over a protruding bolt in the bed of the truck, and the other extends down to a slot in the rear bumper. The outfit cost $65 beyond the cost of the truck.

FOR UNDER FLOOR CONNECTIONS

With heavy main feeders coming up from the ceiling below, and many others in the floor slab, the Martien Electric Company provided a framed-in opening for a rear-of-board junction box, in wiring a newspaper building at Cleveland. The junction box was to be hung on the ceiling below, while sectional slabs of insulating materials were to serve as covers for the floor opening.

NO SEEPAGE—Angle frame for floor opening behind switchboard raised above finished floor level.

A rectangular welded frame of 2½-in. angle iron was made up to provide an opening 15-in. wide and 72-in. long. This frame was levelled upon the rough concrete slab about 1-in. higher than the finished floor line. When the cement top was applied to the rough floor it

ZEAL

••• *not apathy*

In the promotion of any business, the zeal—starting with the top executive—usually tapers in intensity with the broadening of the organization diagram.

The executives of the TRIANGLE organization believe that they cannot function with becoming precision unless the organization flow is fully impelled by exactness in every remote detail. It must be right!

So zeal for Precision is the first qualification of the most obscure worker . . .

ZEAL can be acquired *as a habit* just as easily as can apathy . . . and the result is an organization with which it is refreshing to do business.

TRIANGLE CONDUIT & CABLE CO., INC.

Horace Harding & Queens Blvds. ELMHURST, NEW YORK CITY, N. Y.

ARTERIES FOR ELECTRICAL SYSTEMS

It MUST *be right!*

WIRING Methods

[FROM PAGE 30]

was sloped upward around the angle iron frame. Sufficient raise above the finished floor was given to prevent water from seeping into junction box.

The liberal opening dimensions were required to allow for bringing nine 800,000 c.m. main feeder cables up to the switchboard from four 4-in. conduits that were racked along the ceiling below.

A NEW DEAL FOR CIRCUIT CONTROLS

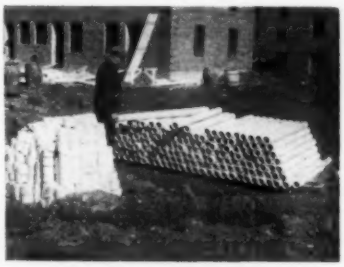
There was no guesswork about the probable salvage values of old switches, during the recent rewiring of a large Chattanooga, Tenn. foundry. New switches were installed as well as new runs of wire and conduit, to equip the enlarged plant with a wiring system that could stand severe usage with the lowest possible maintenance expense. Wiring by the Terrell Electric Co.

OLD-TIMERS—Some of the veteran switches and open wiring still in place before the re-wiring crews arrived.

MODERN EQUIPMENT—This tapered-down array of new switches is typical of those connected up in the re-wiring program.

HOUSING PROJECT TRENCH METHOD

Such gleaming white materials should not be hidden in trenches! This happens to be a pile of Johns-Manville



TRENCH RACEWAYS—Some 5-ft. length of fire resistive, moisture repelling non-metallic conduit ready for a housing project trench feeder system.

Transite Conduit-W of the 3-in. size, for a Federal Housing Project in Chicago.

Ernest Blohm, super for the Wadeford Electric Company is shown, about ready to start a gang putting about 7,000 ft. of this conduit into trenches. They will serve as raceways for feeders that connect between the various buildings of this project. About 6,000 ft. of sewer tile is also being put in for the underground telephone cables.

This material comes in 5-ft. lengths, which are laid in the trench upon a mat of sand. The joints are tarred before being coupled up, then some more tar, after which they are taped to exclude dirt or grit. A layer of sand is then filled in over the conduit, before the final earth back-filling is done.

COLOR CODING

Jack Stockham, of the Kieswetter Electric Co. of Syracuse, N. Y. says that six colors of branch circuit wire greatly simplify making up joints and connections on complex circuit layouts. On the Syracuse Medical College building, a large number of three-way switches and special lighting circuits made a coding system advisable. Separate colors of branch circuit wiring were used, black for the hot wire from the panel, white for the neutral, yellow for go-betweens on the three-way switches, red, blue, and green for the switch wires.

An answer to the demand for a non-tamperable fuse that's PRACTICAL — because it

DOESN'T BLOW NEEDLESSLY

1 Stops circuits being robbed of protection

The Fustat cannot be replaced with a penny or slug — and tampering them with any other material is practically out of the question. Nor can it be replaced with a size that is too large — the size that can be inserted is definitely limited.

But that is only part of the story

A non-tamperable fuse that would blow on starting currents would be impractical and a terrible nuisance. So the Fustat . . . .

2 Stops needless blowing — and so wipes out any excuse for tampering

The Fustat won't blow when motors start on washing machines or other appliances. This removes the major excuse anyone has had to tamper fuses or use fuses larger than permitted by the Code.

Protects flexible cord against burnout — in spite of long time-lag

The Fustat contains a fuse. The ability of a fuse to protect against dangerous cord shorts or grounded sockets is well known.

3 Answers demands of today's circuits

For what other device than the Fustat can make safe protection remain safe . . . . protect against dangerous cord shorts as well as overloads . . . . eliminate needless blows.

Adapter fits Edison base fuse holders and locks in place. Retails at 7½c
Must be ordered separately.

The FUSTAT

Retails at 7½c in 15 to 30 amp. sizes

Write for full information to any of the undersigned

BUSSMANN MFG. CO.
University at Jefferson
St. Louis, Mo.

KIRKMAN ENGINEERING CORP
121 Sixth St.
New York, New York

NATIONAL ELEC. PRODUCTS CORP.
Fulton Bldg.,
Pittsburgh, Pa.

"Half Wiring Systems" Are as Foolish as "Half Hats"

PROTECT YOUR REPUTATION — DON'T SELL "HALF WIRING SYSTEMS"

Selling "half wiring systems"—inadequate wiring — is like selling half hats — nobody is satisfied. Yet many "half wiring systems" are sold. The contractor injures his reputation. The building owner is dissatisfied with the poor service his wiring gives and is at constant expense to make the system more complete.

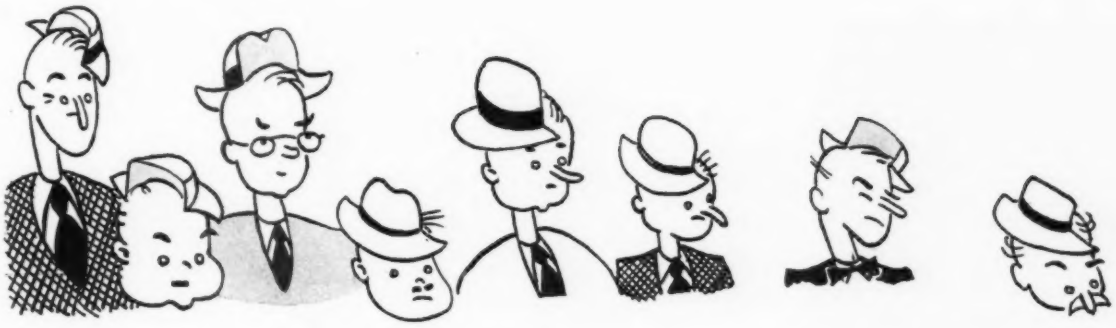
Sell adequate wiring in the first place. You will make more money because the jobs will be larger. Your customers will be satisfied.

Point out that "half wiring" is more expensive in the end because of the rewiring that will be required and because voltage losses with "half wiring" will increase monthly electric bills.

Emphasize the advantages of proper wiring and quality wiring materials. Tell your customers about the comfort and convenience —which satisfactory wiring brings especially when G-E high-quality wiring materials are installed.

GENERAL ELECTRIC

APPLIANCE AND MERCHANDISE DEPARTMENT



Increase Your Profits—Let General Electric Help You

For years General Electric has recognized the need for adequate wiring and has endeavored to help you plan, sell, and install it. Right now, more than ever before, General Electric can help you in two ways: (1) With quality wiring materials; (2) With wiring methods.

G-E Wiring Materials are carefully designed to make them easy to install and for long life. The line is complete, including G-E White Conduit, Building Wire, BX, BraidX, Switches, Convenience Outlets, Lampholders, Circuit Breakers, Fuses, etc.

General Electric engineers have developed new wiring methods for homes and small buildings which assure wiring adequacy and provide comfort, convenience and economy in the use of electricity. These wiring methods are called G-E Home Wiring. They are adaptable to all types and shapes of small buildings.

For further information about G-E Wiring Materials or G-E Home Wiring, see your nearest G-E Merchandise Distributor or Write to Section CDW-8811, General Electric Company, Bridgeport, Conn.

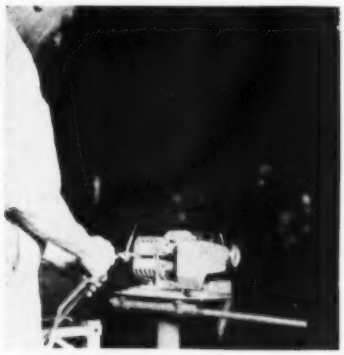
WIRING MATERIALS

GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONN.

Motor Shops

POWER INSULATION STRIPPER

Coil ends are stripped of insulation and enamel, ready for soldering, by a handy machine at the Boustead Electric and Manufacturing Company, Minneapolis, motor shop. Two fine wire brushes, revolving at 3500 rpm., clean the ends as rapidly as they can be inserted into a slot in the guard. An adjustable guide may be set to trim the insulation back for a predetermined distance. A bar below the operating head provides a convenient hanger for the coils. Lint is drawn away from the brushes and down into the base by a blower.



COIL ENDS—This high speed insulation stripping machine cleans off cotton and enamel and polishes bright.

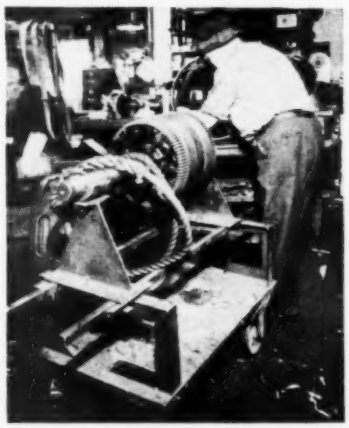
WINDINGS FOR HERMETICALLY SEALED MOTORS

In rewinding hermetically sealed refrigerator motors, cotton fuzz or lint, from the double-cotton-covered magnet wire must be prevented from getting into the sealed-in needle valve. According to George C. Tatem of the Electric Refrigerator Motor Company, Inc., of Philadelphia, this trouble is avoided by singeing the new windings over a gas flame, before closing up the motor housing. It is found to remove all fine fuzz or fibers, which would ordinarily be circulated within the enclosure and eventually accumulate near the needle valve.

ADJUSTABLE DOLLY

Heavy armatures and rotors are handled by the Barker Fowler Electric Company of Lansing, Mich., with a dolly, that has sliding adjustments for accommodating various slot or bar lengths, between the shaft brackets. In addition, the supporting structure leaves a clear space on the dolly platform, upon which end rails or other parts may be placed, for quick transportation around the shop.

The base of this dolly is 24-in. wide, 40-in. long, and rests on two 7-in. wheels and two 6-in. swivel casters. End brackets were formed, 11-in. high, out of 2-in. L-iron, to support a pair of 1¼-in. square, 60-in. long, steel slide rails. Upon these rails are 12-in. high, bevel-end I-beams, that serve as pillar blocks for two large babbitted half-bearings, upon which the shaft of a rotor or armature is placed. The pillar blocks may be moved apart on the slide bars, to clear whatever size equipment is to be handled.



CRADLE ON WHEELS—Heavy rotors and armatures handled on portable and adjustable dolly.

VARNISHING FIRE-DAMAGED LAMINATIONS

Just how much damage has been done to the laminated core of a squirrel-cage motor that has been in a bad fire is hard to determine. So the Electical Motor Repair Company of Trenton, N. J. impregnates and bakes the cleaned stator before installing new windings.

A 5 h.p., 1800-rpm., 3 ph., 200-v., Wagner stator is shown after it had been dipped in thinned Dolph Chinalak No. 7 varnish. After the frame is washed clean of the fresh varnish, this stator will be baked three to four hours at 300 deg. F. This is expected to provide a hard film of varnish between layers of the stator core laminations. After the bare stator has been dipped and baked, new windings are installed and given their conventional impregnation and baking.

FIRE DAMAGED—Bare stators from fire jobs are dipped in this varnish after being cleaned, before new windings are installed.

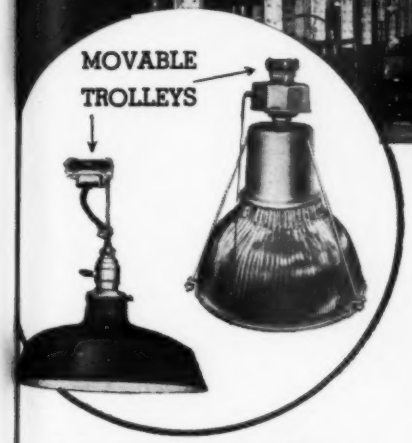
MATCH-UP BEARING DISPLAY

Counter trade receives quick bearing service at the Roland Electrical Company of Baltimore, since a sample rack was installed for the parts and service man. Old bearings are usually brought in for duplication, so this company keeps about seventy-five new ones of the most popular sizes, on a rack built to facilitate quick comparisons.

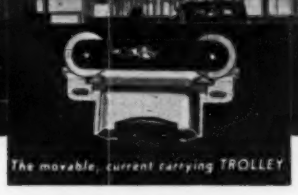
The display outfit was made from a 12-in. by 24-in. board which has angle-iron side flanges that support twelve

BULL DOG
UNIVERSAL TYPE
Trol-E-Duct

This photograph shows a complete factory installation of Bull Dog Universal Type Trol-E-Duct —a modern system of movable electric outlets for flexible lighting fixture arrangements.



Two types of lighting fixtures each attached to a TROLLEY which serves both as feeder and movable means. Any type of standard lighting fixtures can be adapted to Trol-E-Duct.


The movable, current carrying TROLLEY


Cross Sectional View, Showing Rolling TROLLEY Inserted In DUCT


Underneath view of DUCT in which Busbars are mounted and into which TROLLEYS are inserted

Bull Dog Universal Trol-E-Duct system of "Lights on Wheels" is FLEXIBLE. Lighting units can be moved freely in either direction along the duct run . . . additional units can be added at will. Changes in the lighting setup can be made quickly, easily and economically to conform with changes in factory layout. . . . As contrasted to the expense and inconvenience of changing the position of—or increasing—units in a fixed lighting system, the many advantages of Bull Dog Universal Trol-E- Duct will be appreciated by your clients!

Write for Illustrated Bulletin

Pioneers of Flexible Electrical Distribution Systems

1 The starting point of a Plugmold installation — wires roughed in just above the baseboard.

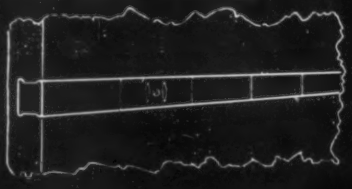
2 Channel placed on baseboard — feed wires carried into channel through knockouts.

3 Elbows in position to carry raceway around detours or slight elevations.

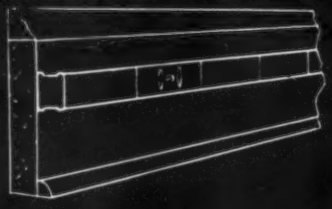
4 Wires carried around doors during the roughing, then connected through knockouts.

5 Plugmold assem around corners and elevations.

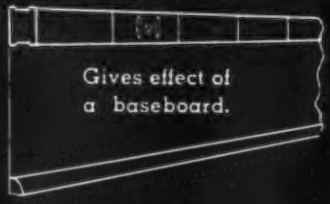
SETS INTO PLASTER:



SETS ON FACE OF BASEBOARD:



SETS ON WALL SURFACE — BASEBOARD HIGH:



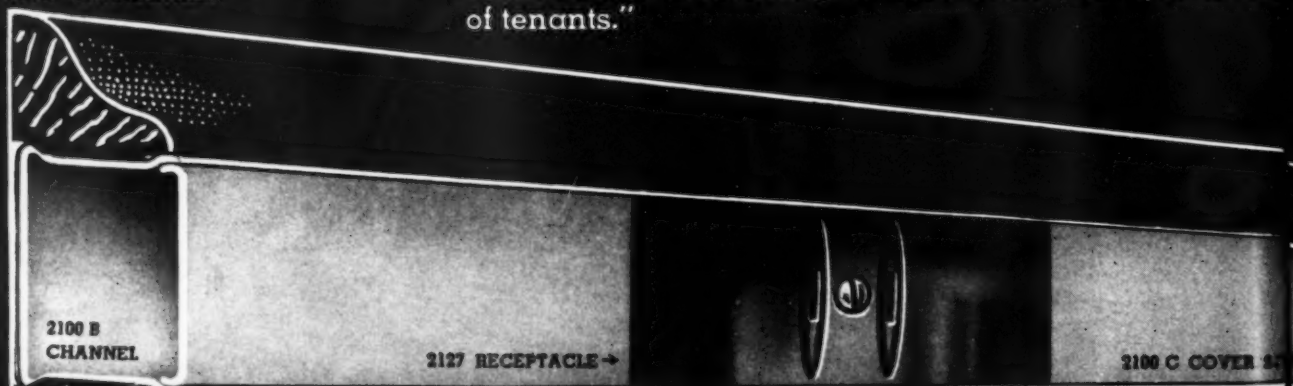
SETS BETWEEN MOULDING AND BASEBOARD:

AMAZING . . .

1. In its simplicity and ease of installation!
2. In its utter adaptability to existing technic — both in electrical and in building fields.
3. In its complete conformity to architectural and decorative trends.

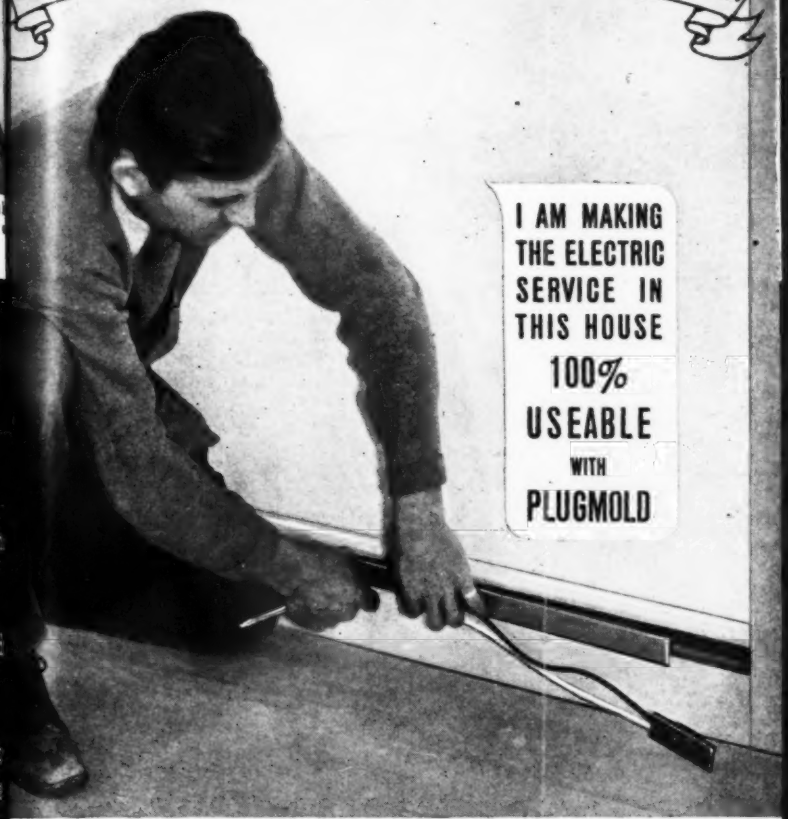
"A new idea — yet it seems like an old friend" — so writes a contractor — "because everything about it, the way it is constructed and the way it is installed, jibes with my experience and my judgment as to good wiring practice."

"Solves the vexatious problem of 'SPOTTING OUTLETS in advance" — writes an architect — "by doing away with the need for spotting them at all. Outlets may be installed AS AND WHERE NEEDED — anytime during construction of building or afterward — to suit needs of tenants."



PLUGMOLD

REWIRE for LAST TIME! PREWIRE FOR ALL TIME WITH PLUGMOLD!



VIEWS OF A TYPICAL PLUGMOLD INSTALLATION

The illustrations above show the successive stages and characteristic applications of Plugmold to a typical suburban residence. The view at right is the exterior of the house built in West Hartford, Conn., by R. B. Swain for the realty firm of Skinner Bros. Architect Walter Crabtree, Jr.

EE BLUEPRINTS OF THIS AND OTHER TYPICAL INSTAL-TIONS SENT ON REQUEST.

CAPACITY up to 6 No. 12 wires. With receptacles in position. Height Overall 7/8". Width Overall 1 1/4".

6 Receptacle is locked into position by quarter turn of screw and cover then snapped into beads.

7 Inserting screw driver in screw head in face of receptacle thereby turning cam into beads.

2100 B

Channel has knockouts for 1/2 inch conduit every 8 inches — also knockouts for screw holes.

2100 C

Cover scored in (3 inch) sections equal in length to Receptacles No. 2127. Receptacles may be substituted for scored sections at any point. Hence outlets may be placed anywhere, anytime — singly or in groups on centers as close as 3 inches.

2127

A small sturdy Plug Receptacle with finding grooves for easy plug connection. Sets flush with Cover 2100C.

NS EQUAL IN LENGTH TO RECEPTACLES

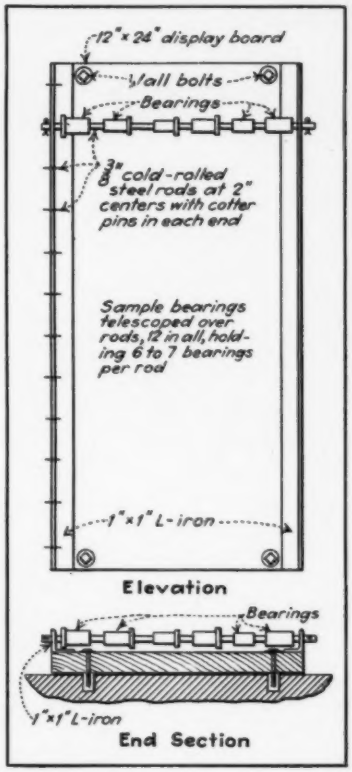
CONTINUOUS OUTLET SYSTEM

-UNIREMOLD COMPANY HARTFORD, CONNECTICUT.

Motor Shops

[FROM PAGE 36]

horizontal rods of ⅜-in. steel. The rods are threaded through six or seven sample bearings and held in place on the

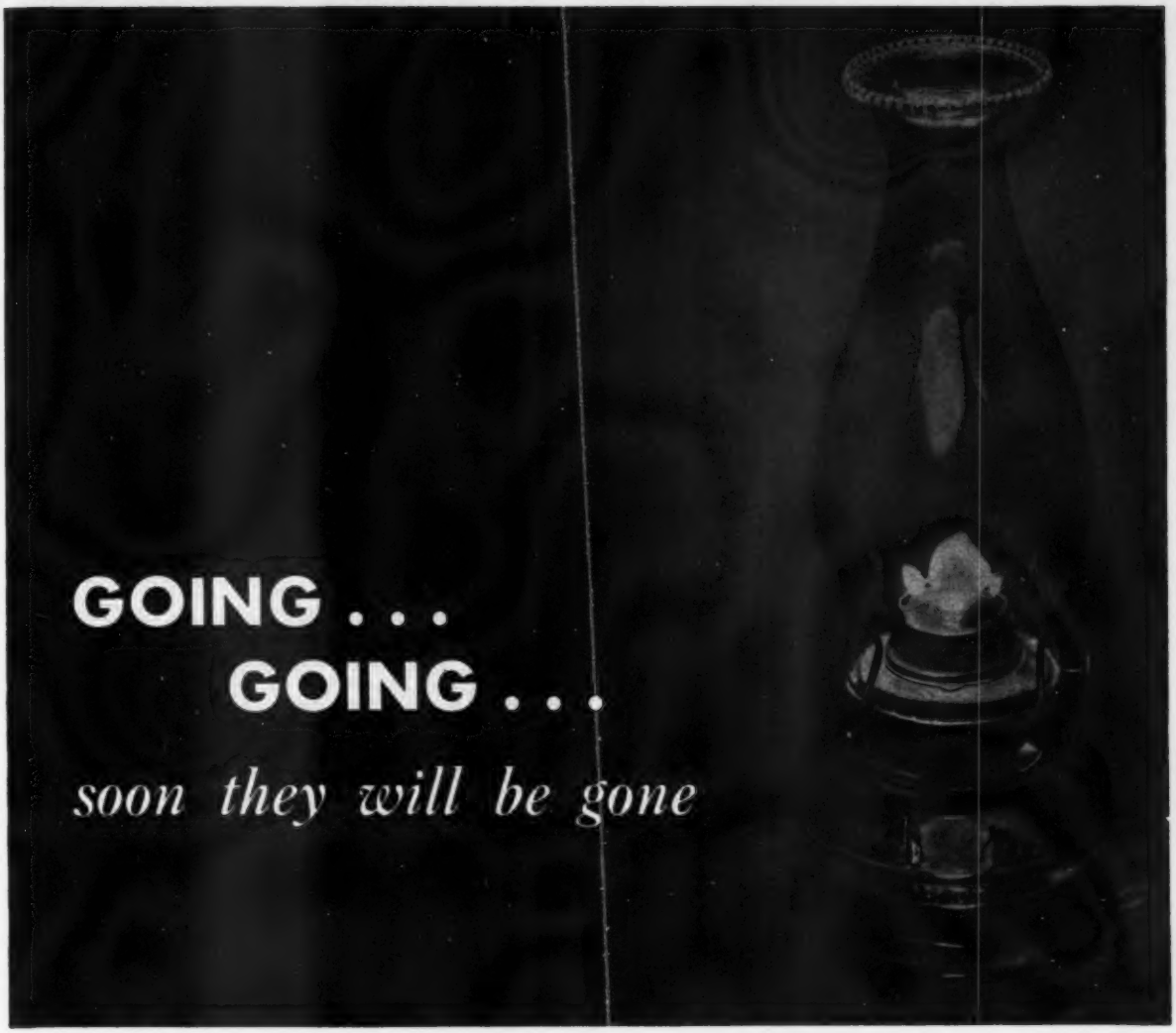


MATCHED PARTS—Display rack designed for speeding up sales time at the small bearing and parts counter.

angle iron with cotter keys at both ends. It is not likely that bearings will be removed by a customer, because the rod cannot be slipped out of place until one of the cotter keys is first taken out of the rod. Since the new bearings are of greater internal diameter than the ⅜-in. rods, they are loose enough on the rack to be handy for matching up with the worn sample.

MOTOR TEST SWITCHBOARD

A compact and convenient switchboard concentrates all fractional horsepower and small apparatus testing to one bench at the Commercial Electric Company, motor specialists, in Joliet, Ill. Jacks along the bottom of the board take the test leads. Knife switches control the circuits. Fuse testing contacts and lamps are located at the top right



ELECTRICITY is going to work for the rural population. The thousands of miles of electrical lines which are now being installed require the use of nearly every type of electrical wire and cable. Engineering problems have made new designs necessary to meet varying conditions.

We have been making electrical wires and cables for many, many years. During that time most of the problems of electrification have been put before our engineers. Our experience and research facilities combined have been successfully called upon in the development of new materials to meet changing requirements.

Look to the American Steel & Wire Company for electrical wires and cables of every description. Our reputation for quality has been built on more than a century of wire-making experience. We welcome the opportunity to be of practical assistance to you in working out your needs for electrical wires and cables, and we are able to supply these needs with products that will give complete service and economy.

American Steel & Wire Company Products for Rural Electrification Projects

Galvanized Steel Conductors · Guy and Messenger Wire · Bare Copper Wire and Strand · Reliance URC Weatherproof Wire · Copperweld-Copper · Service Entrance & Drop Cables · Underground High Voltage Primary Cables · Overhead Concentric Cables · Rubber Covered Wires

ELECTRICAL WIRES AND CABLES

AMERICAN STEEL & WIRE COMPANY

Cleveland, Chicago and New York

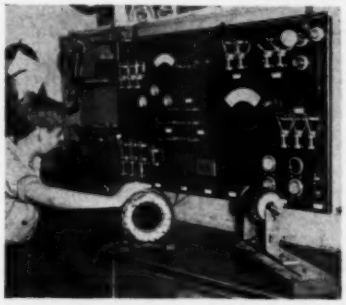
Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

Motor Shops

[FROM PAGE 40]

corner and in the center is a plug receptacle outlet for appliances. Low voltage instruments and test jacks at the right are fed from a tapped transformer.



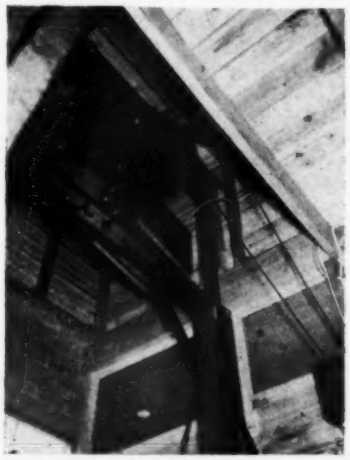
TEST BOARD—With a variety of voltages and test circuits for small motors and appliances. Jacks connect test leads to any circuit.

A sign transformer provides 15,000 volts for insulation breakdown tests.

The metal covered bench top may be switched into the test circuit to detect grounds.

HOIST ELEVATOR

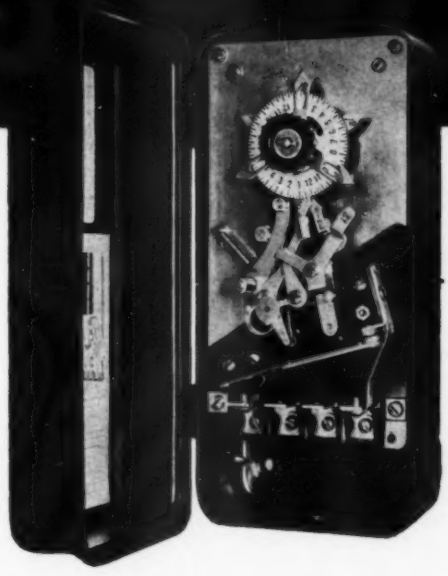
Handling motors and equipment between the first and second floors of the Electrical Maintenance Service Company of Bridgeport, Conn. has been speeded up by an elevator. A five foot square shaft, elevator cradle and platform were built and powered by a one ton Yale electric hoist suspended from a 12-inch I-beam. A rope operating a contactor controls the hoist. A box is provided at the top of the shaft to catch the free chain.



ELECTRIC HOIST—Provides power to elevator in Bridgeport motor shop.

the Unseen Hand...

Curtis Lighting Photo



Sangamo Form K, a sturdy synchronous motor time-switch, self-starting, equipped with silver contacts. Other types, for any possible time-switch requirement, are described in Bulletin 87.

that makes this installation

COMPLETELY AUTOMATIC

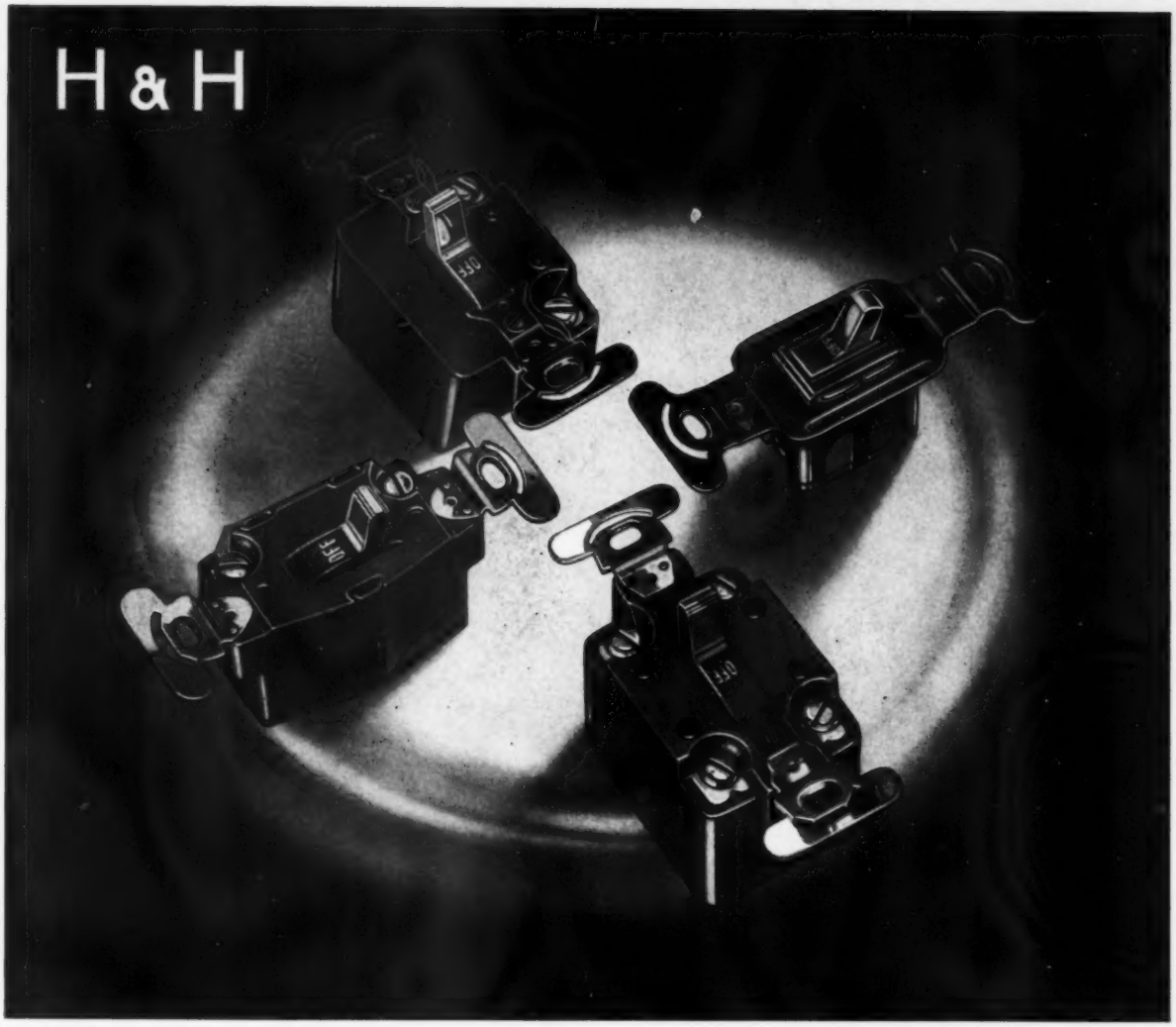
Modern display lighting is a great deal more economical and just as effective when it's turned on at the proper time—turned off when the evening crowds go home.

That's the thing to point out when trying to sell a store owner a Sangamo Time-Switch! Once put in the store, the Unseen Hand becomes a faithful and punctual employee.

For you, there is a generous margin of profit on a Sangamo Time-Switch—a possible wiring job—and a satisfied customer.

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS



TYPE C SWITCHES

Carrying Underwriters' "T" Rating

10—20—30 Ampere sizes:—a line complete for *all* Type C lamp loads; more than adequate to handle the smashing current-surge of Type C lamps.

Bakelite enclosed bases make dust-and dirt-proof switches. Mechanically and electrically engineered for LONG LIFE under tremendous initial overloads.

SOLD THROUGH YOUR ELECTRICAL WHOLESALER

HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

ELECTRICAL

Maintenance

INDUSTRIAL AND COMMERCIAL

How to Get Rid of Those SMALL HEATING PROBLEMS

ELECTRIC HEAT STEPS UP QUALITY, BRINGS IN MORE BUSINESS

Management of Daily Leader-Times, Kittanning, Pa., modernized its plant and equipment to reproduce costly photography and art work from mats. The object was to obtain more national advertising.

Two equipment changes were made: an electrically heated mat scorcher was installed; a 4,500 lb. capacity fuel-fired stereotype casting pot was converted for electric heat by using immersion type heaters and automatic temperature control. The entire pot was reinsulated. The quality of the castings showed a marked improvement, which was reflected in the appearance of the newspaper.

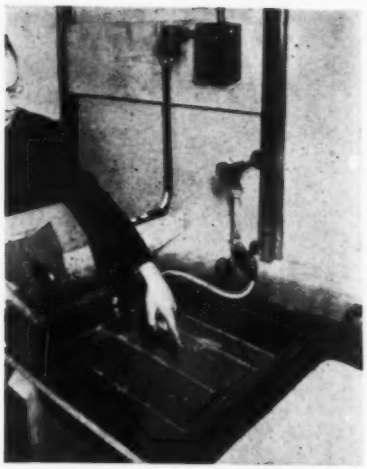
Additional results obtained by this modernization: working conditions were improved; rescheduling of operations resulted in elimination of overtime work; the newspaper is on the streets earlier; savings more than pay the additional power cost for the new electric units.

HUNDREDS of small heating problems arise every day in industrial plants. Perhaps it is necessary to apply a small spot of heat at a particular place on a machine, in order to make the product under operation more "workable"—say at the platen of a press. Perhaps small mixes must be heated quickly, or small quantities of hot water or steam are required at such odd times or in such out-of-the-way places as to make it awkward or costly to operate the main heating system for that particular use. Or, it may be desirable to do away with hazards and discomforts in connection with an existing steam, gas, or torch method of applying heat at a given point.

The electrical maintenance man is in a position to solve many problems like these with the so-called "midget heating units." These units are quite inexpensive, and have been developed to a point where a wide variety of types and ratings are available. They are rugged in construction, and easy to install.

In addition to these midget units for installation on existing equipment, of course, there are also many types of electric soldering irons, gluepots, melting pots, small ovens, auxiliary room heaters, and similar handy units. These commercially available devices have the heating element already built in.

Electric heat is clean, convenient, flexible, accurate, safe, and, as a rule, economical. It requires no tinkering, and simple automatic control is pos-



MIDGET HEATER GETS PHOTOSTAT RESULTS

In the County Recorder's office at Cleveland, operators had difficulty in obtaining clear photostats because the developing solution varied in temperature, especially in winter when water is very cold. To solve the problem, a 750-watt electric immersion heater was installed in the water tank in which the tray of developer is suspended. (A thermostat holds the temperature to 70 deg. F.) In this way the uncertainty of the temperature of the developer has been overcome, and a good solution need not be thrown away because it has become too cold. Operators now feel assured of uniformly good prints. Cost of the installation was $23.50 plus a small charge for wiring.

THEY COUNT THEIR CHICKENS BEFORE AND AFTER

Maintaining uniform temperatures in chicken production has been as effective as in modern manufacturing. At the Snow Hill Hatcheries, Snow Hill, Maryland, hatches of as much as 87 per cent are produced by having all equipment, part of which is illustrated, electrically operated and controlled. One provision made for improved "working conditions" was the use of electric space heaters with circulating fans to maintain an even temperature in the rooms. All-electric incubators operate on 110-220 volts a.c. Starting brooders were arranged for electric heat. The hatchery produced 2,000,000 chicks in twelve months.

sible which eliminates the necessity of constant, skillful adjusting.

Three Types

There are three common commercial types of midget electric heaters—"spot" or "cartridge" heaters, "immersion" heaters and "strip" or "space" heaters. They all operate on the same principle—conversion of electrical energy into heat by passing current through a resistance.

Nickel-chromium alloy resistors are the most widely used, because of their ability to stand up under high operating temperatures. Although resistors of this type are capable of withstanding temperatures of as high as 2,000 deg. F., however, actual operating temperatures are usually much lower because of limitations of other parts of the units.

For insulation most heaters employ mica or porcelain. More recently, special insulating materials for higher temperatures have come into use, such as highly compacted magnesium-oxide powder. Because of the high temperatures, steel is largely used for terminal parts and for bus bars in strip-heater installations.

Cartridge

Cartridge heaters are efficient, self-contained units for localized heating. They consist of an insulator core on which the resistance element is wound. This element is connected to two terminals imbedded in one end of the core.

An insulating material such as magnesium oxide powder is packed between the heating element and the metal casing, forming a compact unit not affected by vibration. These units are suited for heating process machinery, and also form the built-in heating element in many devices such as gluepots, compound pots and soldering irons.

To install such a unit, a hole is drilled in the part to be heated, of a diameter equal to the listed diameter of the cartridge unit to be inserted. The cartridge expands in use, and fits the hole snugly. Where possible, it is advisable to extend the hole entirely through the part, so that the unit may be driven out readily if desired.

Immersion

Immersion heaters offer an economical method of heating liquids in tanks, kettles or barrels. As the name implies, the metal sheath containing the heating element is dipped into the liquid.

The "screw-in" type immersion unit contains a head with standard pipe threads and can be easily installed after a hole of suitable size in the barrel or tank is drilled and tapped. The unit should be installed either vertically through the bottom, or through the side, to assure its being covered with liquid at all times.

The "gooseneck" type of immersion heater is designed to slip over the edge of a tank, with the terminals hanging down on the outside.

During operation, all immersion units must have their active heating portions entirely covered, or they will overheat and burn out. Care must also be taken to keep immersion units clean. Also, free circulation of the liquid around the heaters should be provided.

Where solutions to be heated are acidic, care should be taken to use a heater with a lead or other acid-resistant sheath. They should be inspected regularly and accumulations of carbon or foreign material should be removed.

Strip

Strip heaters are not designed for immersion in liquids or imbedding in compounds. They are simply metal sheaths along which suitably insulated resistance coils are stretched. Mounting slots are provided at both ends of the heaters. They are adaptable to hundreds of uses, such as process machinery, drying ovens, matrix scorchers, warming tables, drying cabinets, pipe lines, incubators, valve and pump houses.

Regulating the Heat

Temperature control can be manual or automatic depending upon the refinements required. The automatic can be regulated within very close limits.

Three-heat manual control is possible when two units are used or when a unit has two heating elements. Three-heat switches make possible three different wattages by changing the connections between the power circuit and the two elements.

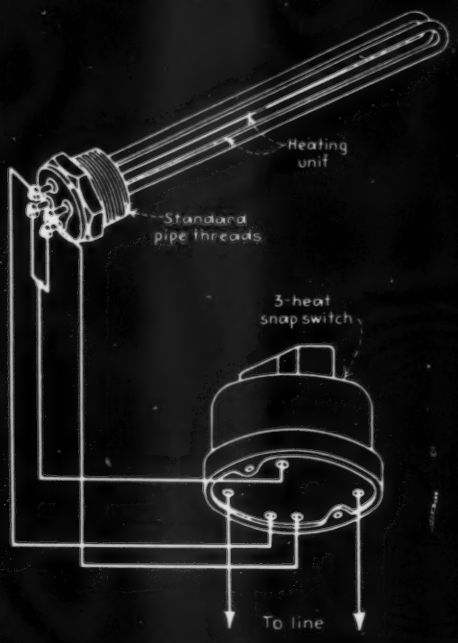
Where heaters of small watt rating are used, manual control is practicable, by means of a rheostat in series. This gives close regulation, and avoids the complication of sectionalizing the heaters.

Of course where regulation is at all important, automatic control is most satisfactory of all. A thermostat or other temperature-responsive device is used. For low watt units it opens and closes the circuit directly; for higher watt units, it actuates a suitable magnetic switch.

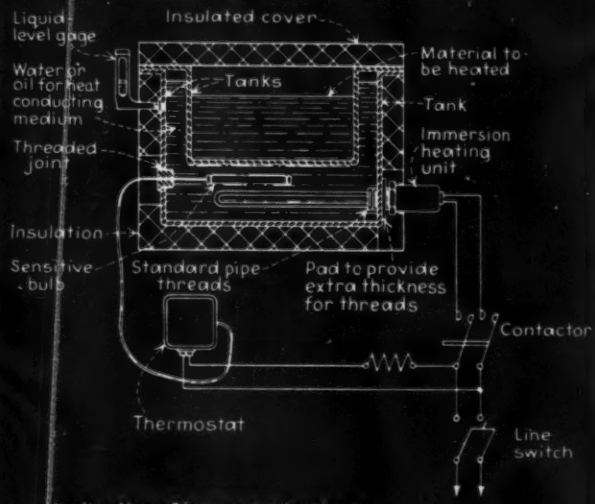
For controlling liquid temperatures

ELECTRICAL MAINTENANCE GUIDE SHEET

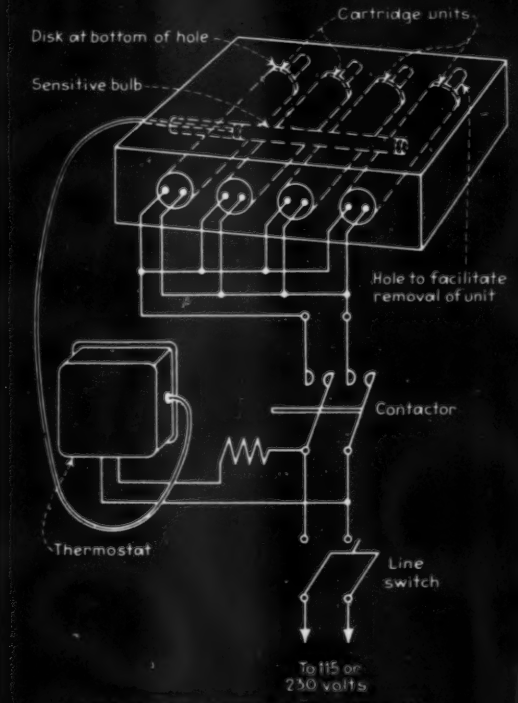
Typical Applications of Small Electric Heating Units



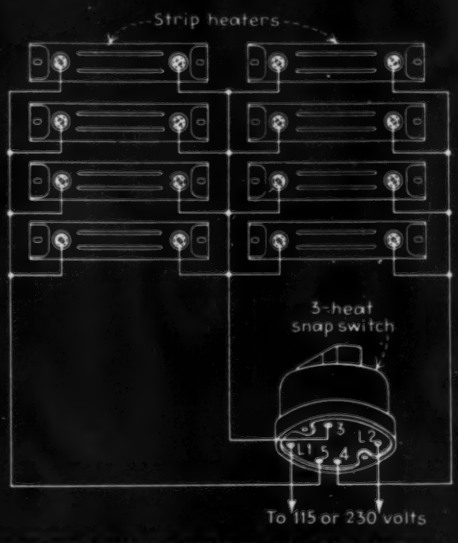
Immersion heater connected for three heats



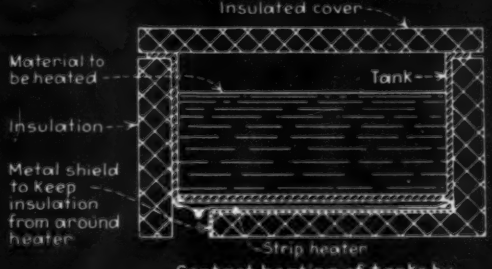
Application of immersion heater in heating heavy viscous liquids and other materials which carbonize readily



Application of cartridge units with automatic temperature control



Arrangement of strip heaters with 3-heat manual control. While wire connections are shown, bus bars can frequently be used to better advantage



Contact heating of tanks by means of strip heaters

with automatic thermostat arrangements, the sensitive element or bulb may be directly immersed, provided the liquid will not attack it or the capillary tube connecting it to the bellows in the thermostat mechanism. In practically every application, there is room to put the bulb next to the material to be controlled.

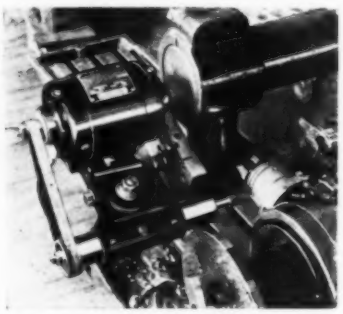
Advantages of automatic control are well worth the cost of installation; indeed, without it, many applications would be impossible. Uniformity of temperature is provided. Ample heat is supplied without waste of power and no attendance is required.

"Two Birds With One Stone"

A textile mill near Bethlehem, Pa., has eliminated a maze of overhead shaftings and installed individual drive. Not only were the machine drives made more flexible and efficient, but the changeover also permitted the installation of a modern illuminating system. Light intensity of fourteen foot-candles was obtained throughout the plant. With the better working conditions increased production became apparent immediately.

Portable Grinder Solves Milling Problem

A Racine shop foreman ran into a peculiar milling job. He had to mill a spiral in 50 aluminum end caps. To do



***PRECISION GRINDER**—with fishtail cutter in quill to mill a spiral.*

this economically, a precision portable grinder was mounted in a milling machine and a high-speed cutter was chucked into the grinding quill. The setup was easily made and the job worked out because the cutter was driven at the correct speed for milling aluminum.

The equipment used included a Dumore No. 5 grinder with "D" quill, Milwaukee miller and a ¼-in. fishtail milling cutter.

How to Make Carbon Brushes "Toe the Mark"

By L. L. Stoffel

Chief Engineer,
The Ohio Carbon Co., Lakewood, Ohio

Proper inspection and servicing of carbon brushes on d.c. and a.c. machines have an important bearing on the useful life and performance of the motors or generators concerned. It is not sufficient merely to make a temporary cure for troubles which may occur. It may be advisable to use makeshift means of curing sparking, heating or wear, in order to avoid a shutdown during working hours.

The apparent cause should always be investigated fully as soon as possible to determine whether it is not actually a symptom of something deeper. Thus, sparking may often be temporarily suppressed by tightening the spring pressure somewhat, but such action is of little use unless the reason is found, as to why sparking ever occurred at all.

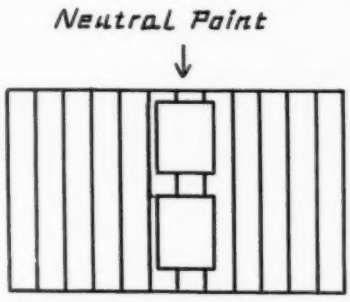
Be Systematic

A proper system of reporting the result of each inspection helps in two ways. First, it eliminates the risk of overlooking some part of the inspection and servicing which should have been done. Second, it affords an excellent record of the progress of any developing defects—particularly those due partly or wholly to grounds. In fact, a full record enables you, instead of the machine, to decide when it is to be shut down for repairs.

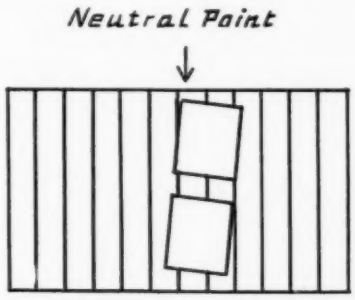
Brush Rigging and Studs

Sometimes the rocker will work loose, if it is of the adjustable type. Possibly, though seldom, one or more of the brush studs may work loose, either because the holding nut has loosened up under vibration, or the insulating bushings have shrunk or become soft from oil-soakings. In either of these cases the alignment of the brushes will be disturbed, and more or less violent sparking take place.

Such sparking is likely to be "more" rather than "less," because the alignment is doubly changed; first, through the brushes being skewed, so that they



***STUD STRAIGHT**—Brushes on neutral point, cover three bars on commutator.*



***LOOSE STUD**—Effect of a loose brush stud on commutator bar coverage. The brushes on the skewed stud are collecting from four bars instead of three bars.*

cover more commutator bars than the design calls for; and second, because the spacing of the studs around the commutator is now unequal. In an interpole machine, especially, very little looseness will cause dangerous and destructive sparking and heating. One or more loose stud connecting cables will have much the same disturbing effect on commutation.

Pigtail Inspection

Pigtails, where used, are an important factor in handling the current to or from the brushes, to which they are connected, so it is vital that they should be in good condition, unbroken either partly or wholly, and properly connected electrically both to the brush holder and to the brush itself. A bad pigtail connection will not only throw an extra load on to the other brushes, but will also cause pitting of the inside of the holder. The pitting occurs because the little current that the brush can handle is forced to jump the sliding contact between the brush and the inside of the holder.

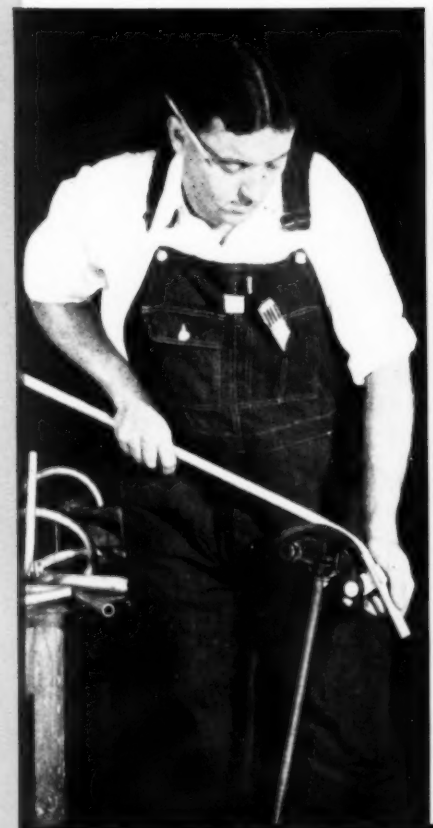
Brush Holders and Springs

Examine the inside of the brush

NO OTHER RACEWAY FOR WIRING CAN GIVE YOU *all* THESE FEATURES

- Cold-Rolled Open-Hearth Steel
- 100% Electric Resistance Weld
- Adequate Protection
- Light Weight
- Easy to Cut
- ✓ Easy to Bend and Rebend
- No Threads
- 3 Simple Fittings
- Knurled Inside Surface
- Uniform Corrosion-Resistance
- Easy to Install
- Universal Acceptance
- Low Cost
- Widespread Distribution
- Assistance of a Field Force

PERFECT BENDS



Easy to Bend

Easy to Straighte

ELECTRUNITE Steeltubes

Reg. U. S. Pat. Off.

MORE THAN 150,000,000 FEET INSTALLED

ON ONE EASY SWEEP

WITH THIS BETTER RACEWAY FOR ALL TYPES OF WIRING

The more bends on a job, the more you'll appreciate ELECTRUNITE Steeltubes. Because this modern raceway is made from cold-rolled open-hearth steel, electric resistance welded into tubing—because it is made without excess wall thickness—it may be bent easily and *accurately* to any predetermined shape. A simple roll-type bender makes possible a 90° bend in one sweep. Short "kicks" and "dog legs" are simple matters. Vises are unnecessary.

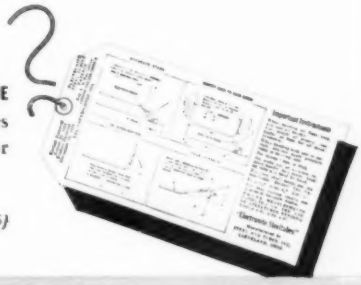
ELECTRUNITE Steeltubes may be straightened and rebent without distortion or damage to the tubing or its rust-resisting coating. Even "kinks" may be straightened to original shape.

Ask your wholesaler to send out the Steeltubes man with his "bag of tricks."

THIS TAG ON EVERY BUNDLE — of ELECTRUNITE Steeltubes gives simple instructions for making all types of bends.

• • •

Knurled inside finish (Patent No. 1,962,876) available in ½", ¾" and 1" sizes.



ELECTRICAL DIVISION

Steel and Tubes, *Inc.*

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . . OHIO

SUBSIDIARY OF REPUBLIC STEEL CORPORATION

holder faces for possible pitting, and correct it if need be. See that the pigtail holding screws are tight, and that the threads are well-fittings—otherwise they will work loose in spite of every attention. Test the springs. They may in some cases become softened by being overheated in service. If so they cannot provide proper brush contact pressure.

There is one rather important point to remember, when graphite brushes are used. These brushes tend to expand decidedly more than do the carbon type. Thus a brush that seems to slip back and forth in its holder properly when cold, may jam and stick persistently after a run of an hour or two. Naturally, the resulting sparking makes matters still worse.

Brush Inspection

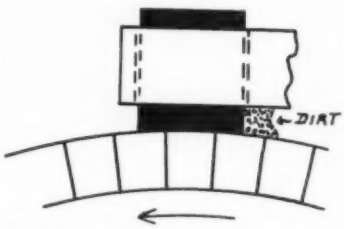
Probably one of the most common causes of sparking, heating, and excessive wear of brushes is insufficient contact on the commutator surface. Obviously, if a machine is designed with a set of brushes of a certain carrying capacity this is based on contact all over the bottom surfaces. Unless this area is provided, the brushes will give trouble. Moreover, should some of the brushes be bedding worse than others—which is usually the case in such a condition—the balance of current distribution will be upset. A few of the better-bedded brushes will be "hogging" most of the load, and wearing themselves out faster in consequence.

To test for proper all-over contact, remove the brush and look at its lower face. The polished glossy sheen of those parts in good contact is easily distinguished from the duller appearance of the rest of the area, if any. If necessary, re-bed the brushes till all are in good condition.

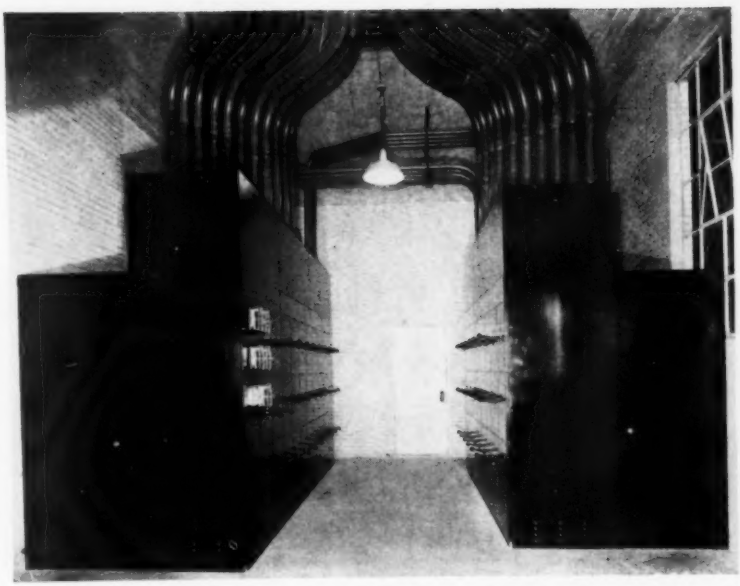
Do not use a strip of emery cloth for the purpose, because its grains may become imbedded in the commutator bars and the mica insulation between them. This will cause brush wear and quite possibly a short circuit between adjacent bars. Sandpaper should be used instead. After the sandpaper strip has been placed between the brush or brushes and the commutator with the sanded side against the brush face, put on all the spring pressure available, and pull the strip in direction of rotation while carefully holding it close down to the commutator contour. This is necessary because there may be some looseness in the fit of the brush in its holder, which would cause a rocking motion and prevent true contact all over, if the sandpaper were pulled back and forth.

All dust should be blown off the brushes and commutator at frequent intervals during the job, lest it work into the insulation or collect further dirt, or oil. It is best, as a rule, not to remove the holder connection of the pigtails of the brush set because once a set of four brushes, for instance, is mixed up there are 120 ways of putting them back—and all but one of them is wrong. Care should also be taken that each brush is put back the right way round. Take care, also, that the slack of the pigtail wires is so disposed that it cannot foul the spring and so stop proper feeding of the brush forward.

In replacing brushes, which are too worn or chipped for further use, be careful to use a grade having the same or similar characteristics as the originals, unless the motor or brush manufacturer advises to do otherwise. Carbon brushes are very exactly graded when made. Their ohmic resistance, contact resistance between commutator and carbon, their hardness, abrasiveness and other qualities are tested with extreme care. Should some of the brushes on any stud differ in characteristics by more than a small amount, selective action will take place. This article will be continued in the December issue.



DIRT TROUBLE *— Excessive bar-coverage effect produced by conducting dirt, increasing the effective width of the brush.*



COMPACT DISTRIBUTION CENTER

A total of 52 distribution circuits is concentrated in a switchboard recently installed at the Philadelphia plant of the Crown Can Company. Dead front, air break, circuit breakers, are used throughout. Each breaker controls a main feeder circuit to a definite plant location.

At the left, in the picture, is a 440-volt, 3-phase, 60-cycle power distribution switchboard with thirty 400-amp. distribution feeder breakers, and seven sub-metering current transformers and watthour meters. Power is supplied from three 500-kva. stepdown transformers.

The switchboard on the right has twenty-two 300-amp. breakers. It handles the lighting distribution which is 120-280 volts, 3-phase, 4-wire. Power is supplied from three 333-kva. stepdown transformers with a grounded neutral.

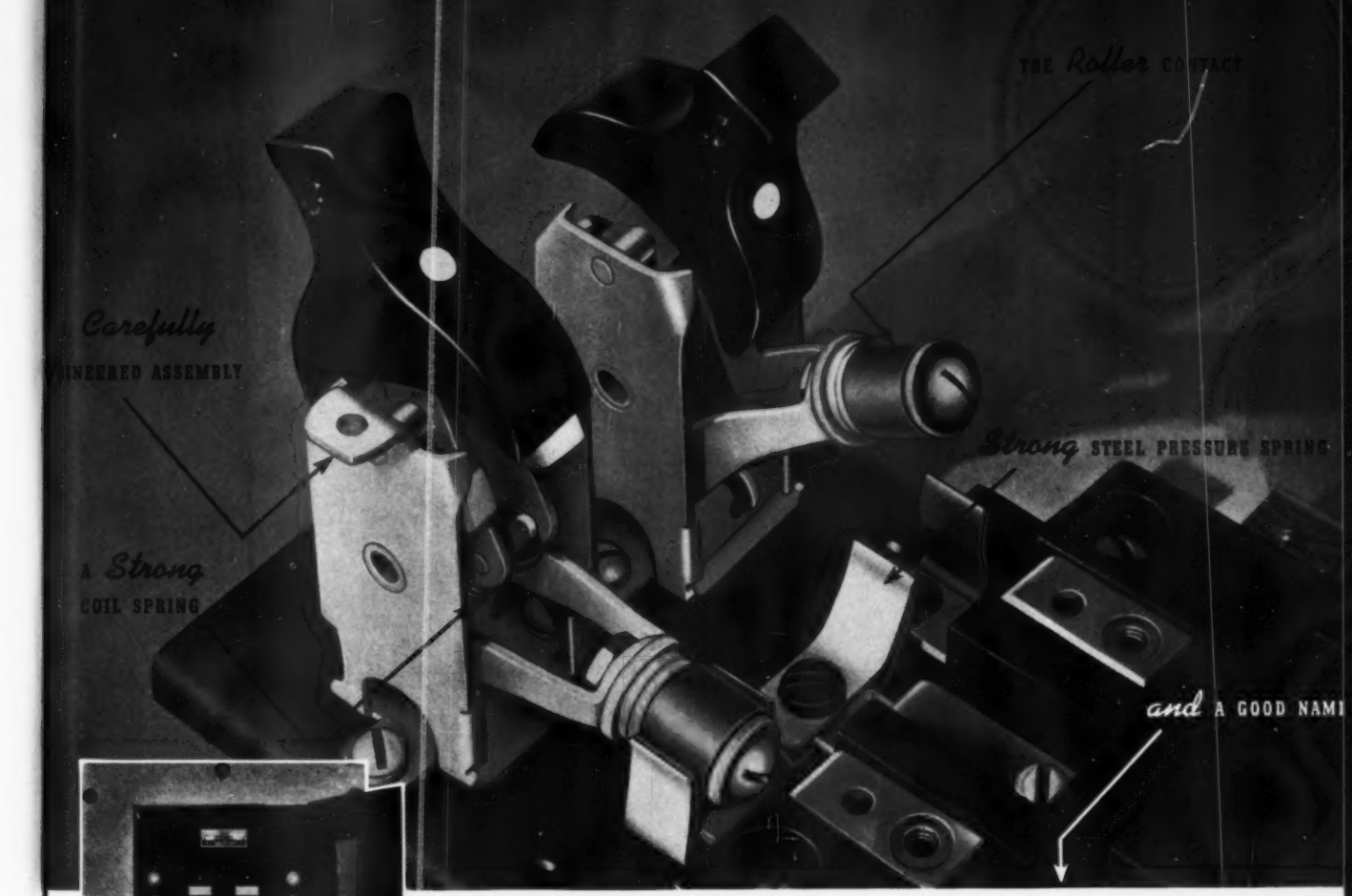
The switchboards were furnished by Westinghouse Electric and Manufacturing Co.

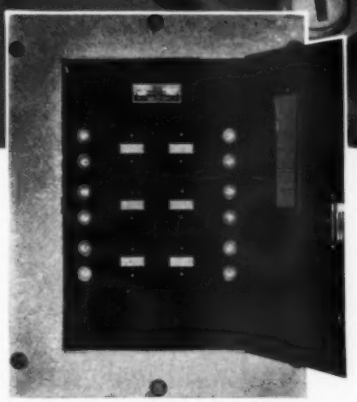
Five Plant Economies

Here are changes which have helped to achieve substantial economies in the plant:

1. Installing a flexible electrical distribution system—to facilitate moving machines from one place to another in the production line.
2. Correcting an over motored condition—to improve power factor.
3. Improving plant illumination—to reduce errors.
4. Correcting an improper drive application—to increase production.
5. Installing photo-electric control—to prevent spoilage by packages piling-up on a conveyor.

8 LBS. PRESSURE AT THE CONTACT IS AN *Exclusive* FEATURE OF NTP LIGHTING PANELS





• Positive contact permitting full flow of the current in the NTP lighting panels we build is assured by the 30 ampere single pole *roller contact* heavy duty toggle switches we use. Copper contacts are re-inforced by a cadmium plated strong steel pressure spring auxiliary contact—not only insuring uniform pressure but maintaining a pressure 6 to 7 times greater at points of contact than any other toggle switch tested. A drop of only 8 millivolts across contact points results, as compared with a drop of from 40 to 150 millivolts on other types of switches. With more than 200,000 of our switches in use—*fewer than one a month is returned for repair or replacement.* Both NTP lighting panels and **TRIPLE S** power panels are built to far more exacting standards than usual specifications require, which results in longer life, freedom from maintenance and—better service. Ask for specification manual for lighting or power circuits.

Manufacturers of Safety Power and Lighting Panels, Knife Switches, Pull Boxes, Cutout Boxes, Cabinets and Switchboards

THE CLEVELAND
Switchboard
» » COMPANY « «

2927 EAST 79TH STREET • CLEVELAND, OHIO

Established in 1900—Member N. E. M. A.

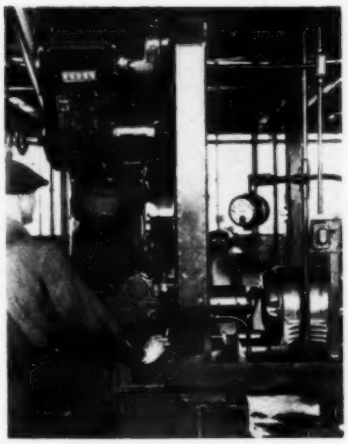
Branch Offices at Chicago, Detroit, Indianapolis, Buffalo, Dayton, Pittsburgh, Philadelphia, Baltimore, Birmingham

As published in ELECTRICAL CONTRACTING—November 1937

Keeps His Eye on the Load

To increase operating efficiency, the General Aniline Works, Inc., Rensselaer, N. Y. installed a conduit-mounted detachable ammeter (50 amp., 60 cycles, 600 volts,) which gives the operator a continuous visual indication of load on a motor-driven pulverizer. Standard conduit fittings were used for mounting the socket which holds the instrument.

The capacity of the pulverizer varies with the kind of material being pulverized, so that load must be fed in such a way as to maintain full load on the drive motor for maximum efficiency and output. The machine is powered by a 20-hp., 440-volt, 3-phase, 3,600-rpm. induction motor.



OPERATOR keeps an eye on the detachable ammeter to get maximum production from the machine.

Voltage Regulation Improved at Low Cost

Although this article relates to a small town having long secondary lines and flickering lights, the idea advanced may serve as a guide for a plant or building where a similar condition exists. Improvement in voltage regulation by banking transformers may be an easy solution. To secure satisfactory operation in case of secondary faults with such a system is something else.

The diagram shows three 1,400-ft. secondary feeders of different copper size served by transformers of different sizes. A motor located at the end of the middle secondary line starts and produces an excessive voltage drop. Such a condition causes lights to flicker and is generally annoying. The voltage drop on this feeder of three No. 6 conductors, for 110 and 220-volt motors of different sizes, may be so high that

3 YEARS ... not a leak!

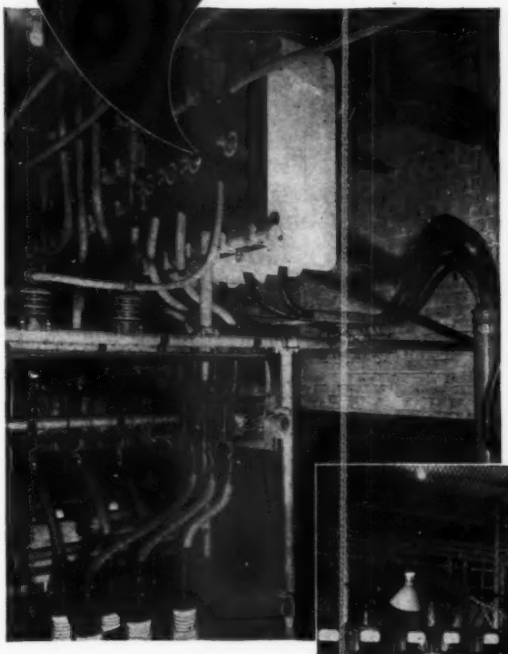
HARVEL OIL STOP

•

THE cable insulating material that does what its name implies

- - - it stops oil leaks

Before Oil Stop cable insulating material was installed, it was necessary to clean up and reinsulate cables about every 3 months. A very costly job.



Three years of uninterrupted service with Harvel Oil Stop cable insulating material.

OIL STOP IS

MOISTURE PROOF • HEAT RESISTING
SLOW BURNING • OIL PROOF
ACID AND ALKALI PROOF

OIL STOP APPLICATIONS

Stop joints on oil impregnated paper insulated power cables.

Terminal seals on oil impregnated paper insulated power cables.

Water tight seals on rubber insulated cables.

Oil tight seal in connecting rubber insulated cables to paper insulated cables.

WRITE FOR OIL STOP BULLETIN

STANDARD OF THE WORLD
IRVINGTON INSULATION
TRADE MARK

Manufactured under **HARVEL PATENT LICENSES** *by*

IRVINGTON VARNISH & INSULATOR CO.

IRVINGTON, NEW JERSEY, U.S.A. *Est.* **1905**

VARNISHED CAMBRIC • VARNISHED CAMBRIC TAPES • IRV-O-SLOT • VARNISHED CANVAS
VARNISHED SILK • FLEXIBLE VARNISHED TUBING • VARNISHES AND COMPOUNDS

MIKE'S MAINTENANCE MANUAL

"A Mica Sliver Makes Commutators Shiver"

By J. M. Zimmerman
Service Division,
Westinghouse Electric & Manufacturing Company, Chicago, Ill.

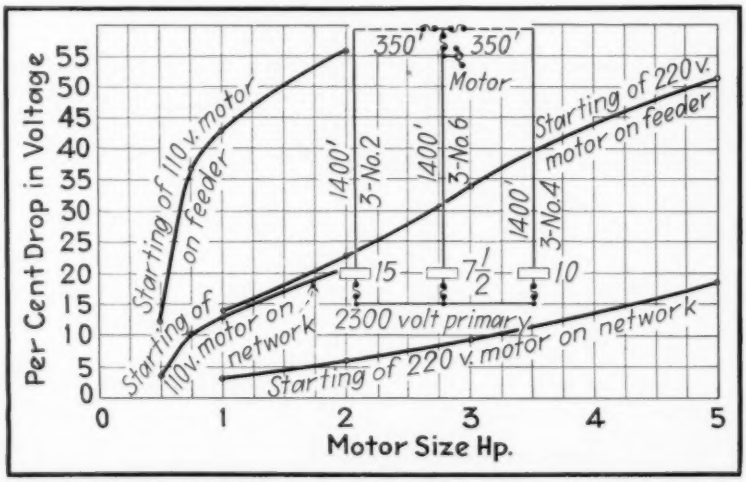
MANY under-cut commutators have slivers along the edge of the copper bars. Unless looked for very closely, these slivers are not seen by the operating man. They will not wear as rapidly as the copper, thus the brush will ride on these slivers and be lifted above the commutator, causing the commutator bar to burn away more rapidly. The mica sliver, of course, will not wear and therefore will continue to be higher than the bar.

If your commutator starts to show a flat spot get your magnifying glass, become a Sherlock Holmes and hunt for mica slivers. If you remove these slivers in time you will save resurfacing the commutator and better the commutation.

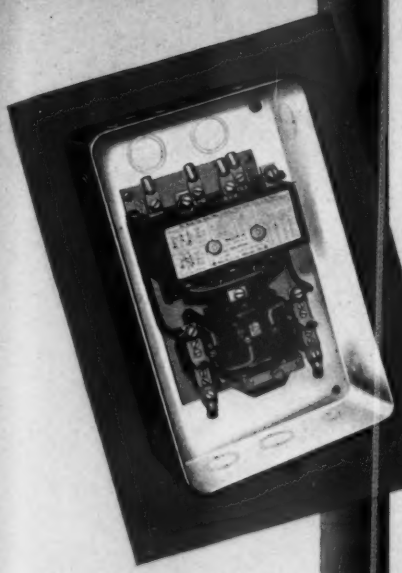
lights will continue to burn dimly or flicker as long as the motor operates.

The lower two curves illustrate how voltage regulation may be improved. The voltage drop was reduced to approximately one-fourth of its former value. This improvement was made by building 700 ft. of secondary—shown by dotted lines—and installing three sets of secondary fuses; the application of the network idea to remote points at lower cost.

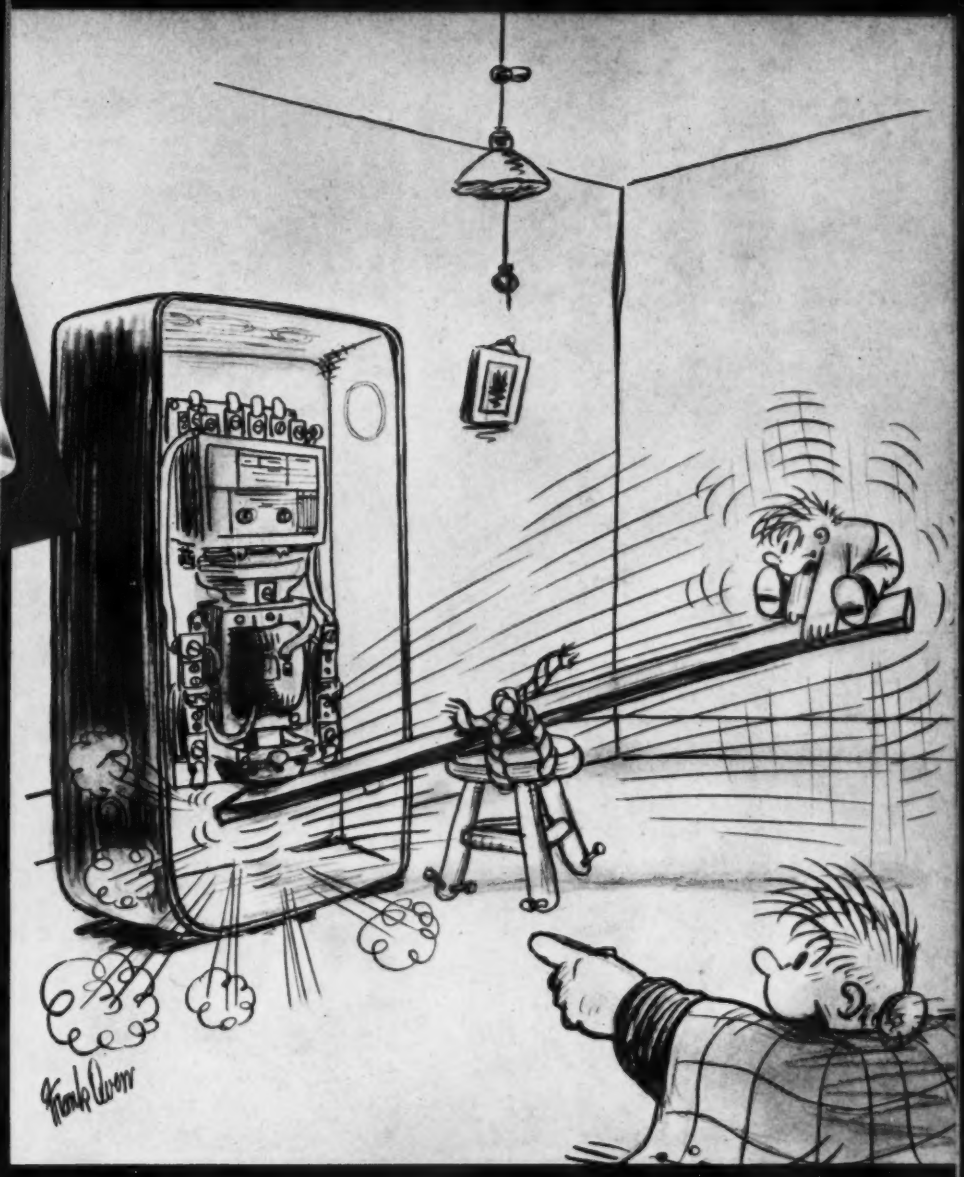
Secondary fuses have the same ampere rating as the transformer feeding the respective secondary. The small transformer is protected from being overloaded due to shifting of load on secondary faults. The primary fuses on the transformers have a rating of 200 or 300 per cent of the transformer capacity. The secondary fuses will always blow and segregate the transformers in case of secondary fault before the primary fuses blow.



NETWORK APPLICATION—Voltage drop reduced by joining far ends of secondary runs through fuses.



Bulletin 709 across-the-line solenoid starter with cover removed. Note the simple switch mechanism.



"So you like that up-and-down motion Philbert?"

Philbert is not the only one who likes the Allen-Bradley solenoid starter's up-and-down motion. Design and maintenance engineers everywhere agree with Philbert. They know this up-and-down solenoid motion has done away with pivots and hinges—assuring that the speed of both opening and closing is consistent. These engineers also know it has practically eliminated contact rebound—the chief cause of contact burning and welding. They know, too, it has permitted enclosed contacts, which help to suppress the arc.

Obtain these advantages by specifying Allen-Bradley automatic solenoid starters. Seven enclosures. Three sizes. Maximum ratings—30 hp, 220 volts; 50 hp, 440-550 volts. Write for "The Story of the Solenoid Starter."

ALLEN-BRADLEY

SOLENOID MOTOR CONTROL

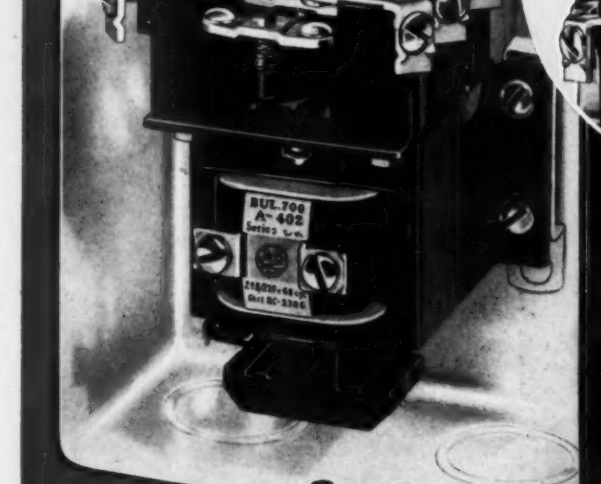
BULLETIN 700 SOLENOID CONTACTORS

—newly improved for even better performance

Over five years ago, Allen-Bradley developed the first modern solenoid contactor—the Bulletin 700. This relay established an unequaled reputation for ruggedness, dependability, exact operation, and long life. Thus, it soon became standard equipment on modern high-speed machine tools.

Now, new refinements—the result of five years' field experience on production jobs—have been incorporated in Bulletin 700 solenoid contactors. The relays have been rearranged to make the wiring terminals easily accessible. Now a clear view is obtained down all contacts. The contacts themselves have been made larger. More millions of operations have been added. However, the basic design of the Bulletin 700 relay remains unchanged. The up-and-down solenoid motion, the double break, silver alloy contacts, and other design features responsible for the relay's success have not been altered.

If you require exact relay operation, write Allen-Bradley. They have a Bulletin 700 relay that will solve your problem.



With the old mounting, wiring the back contacts was a difficult job. The wired relay presented this jumbled appearance.

With the new relay mounting, it is easy to wire all connections. The finished job presents this neat and orderly appearance.

SEND
for Bulletin 700

Allen-Bradley Company,
1307 S. First Street,
Milwaukee, Wisconsin.
Please send me a copy of Bulletin 700.

Name.....

Company.....

Street.....

City.....State.....

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL

They Say Air Conditioning Is Easy [FROM PAGE 24]

and two direct factory branches. In other words, out of eight leading makes of air conditioning (Carrier, York, GE, Westinghouse, Chrysler Air-temp, Delco-Frigidaire, Kelvinator and Frick) one was being distributed by a heating and ventilating house, two were factory operations, one a jeweler, and the rest were electrical industry outlets.

Most surprising, perhaps, was the fact that some of the best distributors in the southeast have been drafted from the ranks of the wiring contractors, pure and simple, and many of the active retail selling agents are contractor-dealers. In many cases, the contractor-dealer has been less prone to emphasize the difficulties involved in selling air conditioning than his brother, the straight specialty appliance dealer. The latter has always attempted to steer clear of any but packaged appliances.

Nothing New in A.C.

But the straight wiring contractor and the contractor-dealer with some appliance selling experience have suffered no inferiority complex about air conditioning. The reason is simple. They are accustomed to estimating wiring jobs running in many cases into thousands of dollars. They are accustomed to bidding on work. They have men of the staff capable of installing compressors, wiring in the units and even doing some elementary painting and carpentering.

Average air conditioning installations, embracing the three-, five- and ten-ton jobs, requires the services or knowledge in part of the plumber (piping), the tinsmith (duct work), the wiring contractor (electrical wiring), the heavy refrigeration man (compressor unit) and the carpenter and painter (finish up work). It stands to reason that, except for the painter and the carpenter, any specialist in these services may eventually qualify as an air conditioning distributor or salesman. But the biggest part of the air conditioning job comes with the wiring installation and the installation of the compressors. Tinsmiths are plentiful and can be hired for each special job.

Computing the load requirements of specific jobs has been a stumbling block to many contractors, otherwise fitted to jump into air conditioning tomorrow. They felt—and not without some reason—that figuring wall areas, cubic content of air, heat loads from doors, windows, sun, artificial lights and human beings, and then boiling these all down into specific recommendations as to compressor size to meet peak load requirements, smacked somehow of higher mathematics—if not magic. Many contractors I talked to admitted that figuring the job was the thing that gave them the biggest headache. But when they figured a couple, they found they were right and from then on they sailed ahead without any inferiority on succeeding jobs.

But many manufacturers provide their distributors and dealers with estimating forms so simple to compute that contractor-dealers have been able to hit their first job on the nail. Chisholm of Tupelo, Miss., said he couldn't believe his would come out right at the first crack, so he submitted his estimates to the manufacturer (Delco-Frigidaire) and when they came back, pronounced correct, he realized that the difficulties of estimating air conditioning jobs had existed chiefly in his own mind.

Miller & Morgan, another contractor-dealer outfit in Salisbury, Md., figure the jobs roughly to be able to submit a bid, and send the estimate to the manufacturer (York) for careful check before any installation is made. Yet this little outfit recently put in a 20-ton compressor job in a local department store. Industrial Electrical Equipment Company—old-time wiring contractors of Savannah, Ga.—have put in some of the biggest air conditioning installations (Carrier) in the city. To them, computing an air conditioning job presents no more difficulties than figuring a wiring job.

For the contractor, who does not feel that his set-up is sufficiently big to allow him to figure on the major installations, there is still the big market for office, small store and residence air conditioning to shoot at. As we have already seen, the big jobs are being pretty well taken care of anyway. But the number of one-ton and three-ton jobs that remain to be sold to small stores is limitless; and for the office and residence market he has two superb pieces of equipment to sell and install—the unit electric room cooler and the attic ventilating fan. Outside of the new home market, in which central year-round air conditioning can be installed at reasonable cost, or winter air condition at no more than the cost of a heating plant, there is the big market of existing homes waiting for some form of comfort cooling in the summer time. That the attic fan answers this problem has been amply demonstrated in many southern cities where installations run into the hundreds every summer. The room cooler is a natural follow-up.

"Talk Turkey" to

Electrical contractors profit by promoting "modernize wiring" campaigns

The country over, an urgent invitation is being made to industrial plants to "modernize wiring". This promotional campaign is producing results from which the contractor benefits. A large number of contractors are carrying on local campaigns in connection with the national effort sponsored by Anaconda.

One New England contractor, for instance, is finding the industrial wiring survey extremely valuable as a "door opener" for getting wiring contracts. This company makes inspections of electrical equipment in any plant and renders a careful report on actual conditions. So successful is this plan that a profitable wiring department is now kept in operation. Many large repair jobs come in as a result of the good will fostered through the work of this department.

The starting point of the "modernize wiring" drive is the *wiring survey*. That is where the two books shown here are used. They give complete directions on making a check-up of antiquated, deficient electric circuits. With these books, contractors are finding it easy to interest industrial firms in making a study of factory wiring.

The time is right for you to make use of this selling plan. We'll send you copies of the books together with other information. You can perhaps get your utility company to participate in a canvass of industrial plants. Mail the coupon at right.

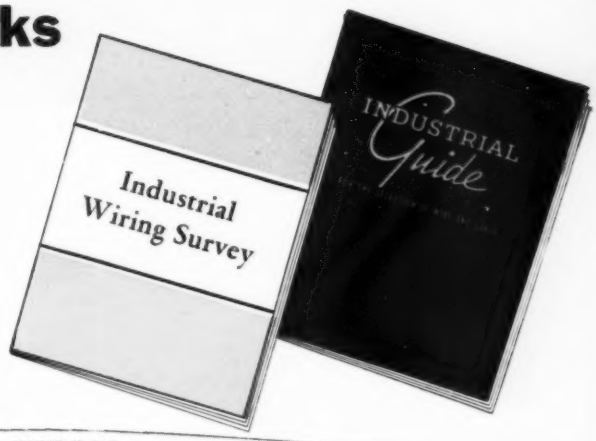
ANACONDA
from mine to consumer
REG. U.S. PAT. OFF. 87556H

ndustrial plant executives

with the aid of these books

"DOOR OPENERS"

These two books are designed to "open doors" for you in contacting the industrial plants in your vicinity. The *"Industrial Wiring Survey"* tells how to initiate a scientific check-up of electric circuits. It makes such a survey easy and productive of valuable results. The *"Industrial Guide for the Selection of Wire & Cable"* tells the plant owner what to do to correct the bad situations which a survey reveals. Together, these books give you valuable sales aid. Write for your copies.



Cause of the important part the POWER ALESMAN plays in presenting the need of dernizing wiring to the industrial plant, devote our November advertising space to this "get acquainted" message. It appears in Time, November 1st; Business Week, November 6th, and fifteen other publications covering the various fields of industry.

ANACONDA WIRE & CABLE CO.,
25 Broadway, New York City

We should like a copy of your books and outline for a campaign.

Signed .....

Street .....

City ..... *State* .....

Company

Sales Offices in Principal Cities

Better Lighting

COLOR SELLING — Matching dress goods under a "North-skylight unit" to show how the fabric will look out of doors.

COLOR CORRECTION FOR INSPECTION JOBS

The appearance of colored objects is influenced by the spectral quality of the illumination. So where the matching of colors is involved careful selection of the light source is necessary for inspection processes. In applying this "spectral quality" of light there are definite problems:

(1) The matching and duplication of colors or tints with that of an established standard on a production basis in the factory. (2) The determination and selection of colors for materials that are to be used under lighting conditions unlike those under which they are produced.

For the first problem, whatever the spectral quality of illumination is used for the inspection of colors on a production basis—daylight lamps, noon sunlight, or north skylight—the important element is the constancy of intensity and quality of that source. Under a constant quality and quantity, very uniform results can be expected after the inspectors have established their criteria of judgment.

For the second problem, regardless of the quality of lighting used for color matching, the objects on a production basis, some thought should be given to the intensity and color of light under which judgment is passed as to their color effectiveness in service. Dress materials selected for brilliance in natural daylight may lose that brilliance under the artificial light of the ballroom. Automobile colors selected under ordinary artificial light may appear quite different on the road at noon.

Here the color-correcting lighting system can be obtained by means of a general or group system of spacing, or by the use of local units. In fact, any of the several qualities of artificial daylight can be applied in a general, or a goup system. But, because of the high absorption of light necessary for duplicating north skylight quality, the more economical plan is to employ daylight lamps and noon sunlight equipment for general and group lighting, and to use the north skylight equipment for local applications over relatively small areas.

TOBACCO FACTORY — Inspecting tobacco under "noon-sunlight globes", for accurate grading by color.

TILE PLANT—Inspecting for color and perfection in a tile plant under the illumination of "daylight lamps".

For any given level of illumination, more wattage must be expended when using color-correcting equipment than with those having no color correction. Based on laboratory tests using commercial equipment, here are the wattage multiplication factors to give equal levels of illumination with color-correcting equipment, as compared with that required for an unmodified quality of illumination—

Clear Lamp in Reflector, No Color Correction — 1

Daylight Lamps, Standard Reflecting Equipment — 1.5-2

Reflectors with Noon Sunlight Globes — 3-4

Reflectors with North Skylight Plates — 6-8

The places for color-correcting light are innumerable. Typical locations are: dye houses and plants weaving color textiles; tile, paper and paint factories; tobacco grading; also commercial places where the materials which are purchased, matched or graded should have the same appearance as under daylight.

SPACING AND MOUNTING HEIGHT RELATIONS

In laying out a system of general lighting, the aim is to provide an approximate uniformity of lighting throughout the room. This eliminates spottiness, and dark corners and makes every square foot of space available for use.

The number of outlets needed in a given area, to insure reasonably uni-

"GAS STATIONS *NEED* MODERN LIGHTING"

A tip from **SUNNY LUMENS,** *the Goodrich Reflexpert*

● Did you know that the average filling station can double its night business with modern illumination? Tests prove that this is true!

What does this mean to you? As an electrical contractor, it means real opportunities around your town for installing floodlights and Standlites—turning "dark spots" into "bright spots."

Why is this the logical time? Because now it gets dark earlier . . . filling stations have more need for good illumination to attract customers . . . to get their share of the gallonage. There's a real sales story for you!

Why Goodrich equipment? Because Goodrich leads the field in filling station lighting. Goodrich developed the Standlite and many other helpful ideas that mean more profit for filling station owners. And the Goodrich line is *complete* with everything they need.

Who'll get this business? *You will,* if you get started quickly. Write today for this new catalog.

GET THIS SPECIAL CATALOG OF LIGHTING EQUIPMENT FOR GAS SERVICE STATIONS

You can use this 40-page catalog as a sales manual. It contains a wealth of information; a full line of specialized equipment, light distribution charts, layout suggestions, etc., to help you plan and sell these jobs. A line to us will bring your copy by return mail.

ASK US TO SEND YOU CATALOG NO. 62

GOODRICH
ELECTRIC COMPANY
OFFICES IN ALL PRINCIPAL CITIES

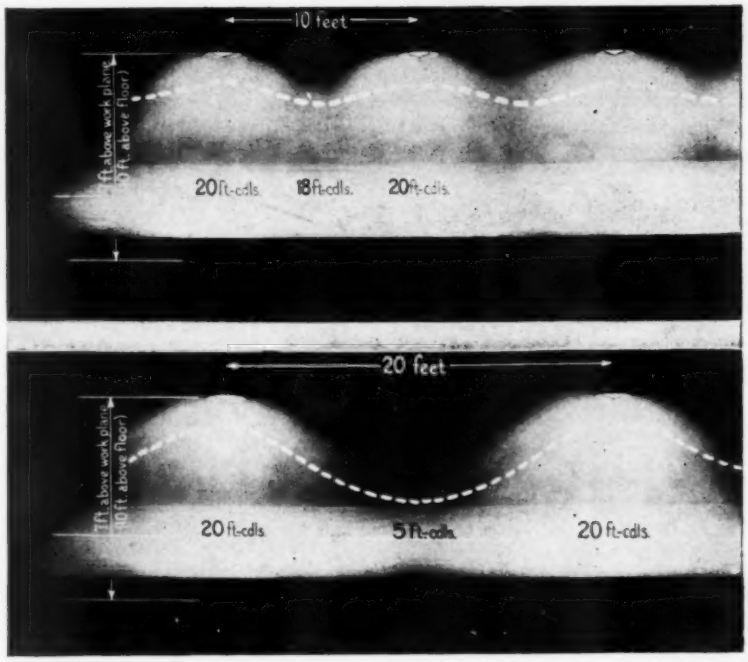
GENERAL OFFICES & FACTORY, 2902 NORTH OAKLEY AVENUE, CHICAGO, ILLINOIS

Better Lighting

[FROM PAGE 62]

form illumination, is determined by the maximum allowable spacing between the luminaires and is in turn governed by their height above the floor. The accompanying illustration demonstrates this principle.

Actually, the spacing required to produce uniform illumination on a task depends upon the height of the unit above the surface to be lighted. However, since most work surfaces are from 2½ to 3½ feet above the floor, the spacing may be considered a function of the mounting height of the lamps above the floor. In general, a spacing in feet, which does not substantially exceed this mounting height, will result in reasonably uniform illumination, as illustrated.



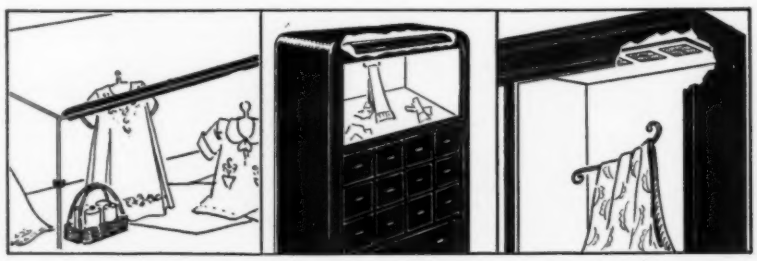
HEIGHT AND LIGHT—See what spacing does to light intensity at a given height.

LIGHTING DISPLAY CASES

Showcases and wall cases require from two to four times as many footcandles as general illumination throughout the store, if they are to stand out prominently and command attention. Standard showcase equipment is available for tubular bulb and Lumiline lamps and in individual mirrored reflectors taking the A bulb lamps.

A common shortcoming in the lighting of wall cases is the use of wide distribution reflectors which fail to concentrate the light on the merchandise display but produce distracting light on the upper background. Small compact parabolic aluminum trough reflectors or other concentrating distribution units are best in most cases.

Large shallow cases may often best be lighted by a row of concentrating prismatic lens plates built in the top of the case. From 40 to 60 watts per running foot of showcase will be required to supply 50 to 100 footcandles along a normal curve of trim.



LIGHTING THE GOODS—Three methods of applying lamps to display cases.

Questions ON THE Code

Answered by
F. N. M. SQUIRES
Chief Inspector New York Board of Fire Underwriters

Size of Common Neutral

Q. *"According to Article 20, Section 2004-b of the Code, 'A common neutral conductor may be employed for not more than eight 15-ampere branch-circuits on three-wire direct current or single-phase system, etc?'*

What is the proper method to figure the size of a neutral conductor for six 15-ampere circuits fed from a 110–220 volt 3-wire single phase system?

Ihave been using the method described under Article 20, Section 2002–14 page 199 and 200 of the 1935 Code.

I have been a reader of your publication for sometime and will greatly appreciate this information.—J.F.B."

A. The common neutral for the six circuits should be figured on the basis of the maximum possible unbalance. This unbalance would occur when the three circuits on one side of the 3-wire system were off.

Assuming that the load on each circuit is 15 amps. the neutral current with three circuits on one side of the system "on" and three circuits on the other "off" would be: 3x15, or 45 amps. This would require a No. 6 wire for the common neutral conductor.

CHANGING PILOTS—Clifford Anderson of Oklahoma City (right) is the new president of the Western Section, IAEI. He is shaking hands with the retiring president, Samuel R. Todd, of Chicago's inspection department.

MICHIGAN'S AMBASSADOR—Ohio contractors meeting at Cleveland hear A. T. Babbitt (left), Chief Electrical Inspector and member of the Electrical Administrative Board of Michigan discuss reinspection and public cooperation with that state's licensing law. C. F. Hammer, secretary-treasurer of the Ohio Electrical Contractors Association, must have enjoyed the talk.

Fittings for Dissimilar Metals

Q. *"On some jobs I have experienced considerable corrosion when using galvanized ground clamps on brass or water piping, while on other jobs they seem to be O.K. Does this indicate trouble on the circuits and that current is leaking from the wires to the grounding connections?—A.C.B."*

A. The corrosion mentioned above is, no doubt, electrolysis and probably is caused by the presence of dissimilar metals in company with moisture. The presence of clear water would not be conducive to electrolysis but the addition of other chemical matter even though slight (generally a weak aciduous condition) would be sufficient to start electrolytic action. This would then soon manifest itself by "corrosion" becoming noticeable. Small local electric currents would be flowing but this would not be evidence that fault currents were flowing as results of leakages from the wires to the ground connections. Of course, the corrosion would not take place in a location which was entirely dry.

The condition does point out the necessity of using bronze, brass or copper grounding connections or clamps with brass or copper piping, and galvanized fittings with iron water pipes. The Code does not cover this point but no doubt, should do so.

Panelboard in Wet Location

Q. *"Would you kindly let me know what kind of panel box should be used in a milk pasteurizing plant? In the room where they wish to place the panel box there is a lot of steam and water. Do they make a water tight panel box?—R.T.P.*

A. If the panel is to be located in an excessively wet location as indicated in the above question, it should be enclosed in an approved weather proof cabinet. This is required by Rule 1303f (1935 Code).

Such cabinets are listed by "Underwriters' Laboratories."

"T" Rated Switches

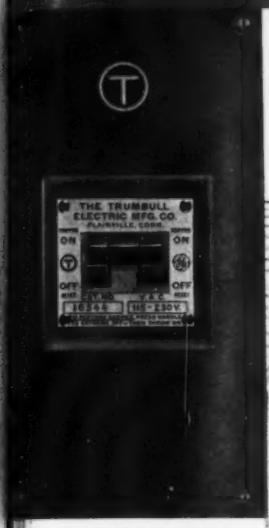
Q. *"I saw in 'Questions on the Code' in 'Electrical Contracting', where F.J.S. speaks of the "T" rating on snap or toggle switches.*

I must confess that I do not know what a "T" rating is. So I got busy and went through my books; I asked two different contractors who know more than I do. I cannot find anybody who does know. Now I am not ashamed to ask you. Please let me know.—F.J.H.

A. It has been found that many switches used to control lighting circuits and having an ampere rating equal to the connected load, would not stand up very long in service where used to control a lighting load. Investigation showed that tungsten filament lamps draw a considerable inrush current on the cold filaments. That is for the period during which the lamp filaments are warming up, a considerable amount of current flows, but as soon as the filaments are hot, the current drops down to the normal rating of the lamp. This inrush is somewhat similar to the current inrush of a motor.

Announcing — TRUMBULL

TYPE "M" MULTI-BREAKERS



NO. 16344 SURFACE

For Service Entrance — Range — Water Heater and Auxiliary Services

FLUSH OR SURFACE

WITH RANGE

Listed on Pages 30-A, 30-B, 30-C, 30-D Catalog 101

A Saving and Why—

Trumbull Type "M" Multi-Breakers, single and two pole only, effect a decided saving in cost and space —

Because —

Up to the present time one and two pole units have been mounted on a 4 Pole unit base and assembled in a housing designed for a maximum of 8 poles or 6 circuits.

Also, these new units permit *separate circuit metering.*

1 and 2 Pole (2, 3, Wire)
Solid or Insulated Neutral or No Neutral
15, 20, 25, 35, 50 Ampere Circuits

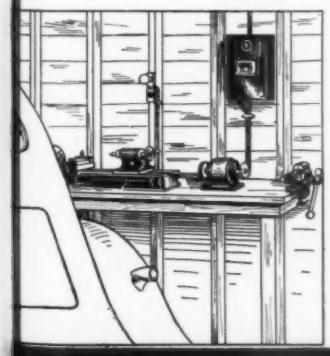
Applications

Trumbull 2 Pole, Type "M" Multi-Breakers permit connections for additional loads at a very low cost for —

Ranges, Water Heaters and Other Services.

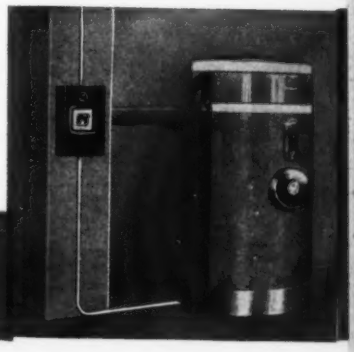
Or, may be used

to control 2-branch circuits *without a main switch* under Rule 405-A, Exception 2, National Electrical Code.



← WITH SMALL MACHINES

WITH OIL HEATERS →



The TRUMBULL ELECTRIC MFG. CO.

PLAINVILLE, CONNECTICUT

NEW YORK • CHICAGO • BOSTON • DETROIT • ATLANTA • PHILADELPHIA • LUDLOW • NASHVILLE • SAN FRANCISCO • LOS ANGELES • SEATTLE

Questions on the Code

[FROM PAGE 66]

Switches having a "T" rating are those which are tested and which successfully operate on a tungsten load.

Bonding of Water Pipe Connections

Q. "Article 9, Section 909, Paragraph F, 1935 N.E.C. states that if the point of connection of grounding conductor to water piping system is on the house side of the water meter then 'the piping system shall be made metallically and permanently continuous by bonding all parts within the building which are liable to become physically disconnected such as at meters and service unions.'

Does this mean that any ordinary water pipe unions commonly found in the system between ground connection and meter should be bonded?—W.K.B."

A. Yes, any unions located between the grounding electrode on the water pipe and the street line should be bonded by bonding jumpers. Also the meters should be jumped. Otherwise, the water piping within the house may be made alive and fault currents may be routed through some other pathway than over the water pipes to ground. It is reported that electrocutions have occurred where the water line has been disconnected.

***EXPLODED VIEW**—For ten years this 60 ampere, 3 pole "safety" switch had been operated without incident in a Ft. Wayne, Ind., gasoline bulk plant. Then one day an employee opened the switch and was taken to the hospital. Gasoline fumes, which had accumulated in the room, were ignited by the opening arc at the switch blades. The resulting explosion blew him out through the door which he had left open behind him. Yes, the building is now being rewired as a "Class 1-D" hazardous area.*

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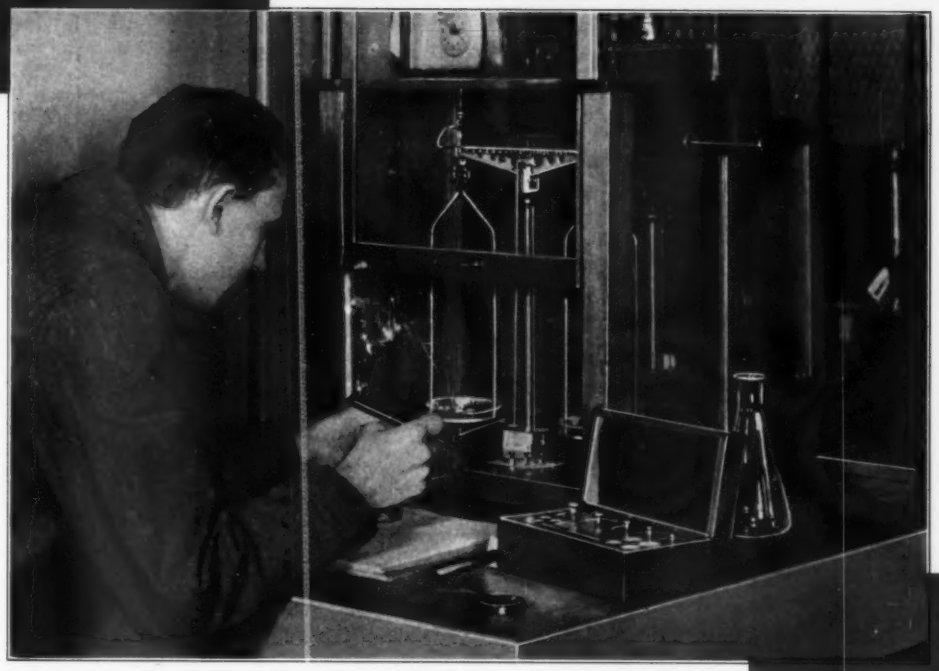

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We Call These Our "Scales of Justice"

For right here in our laboratory, raw materials either acquit themselves nobly or are convicted . . . To name a few cases that come to trial—the moisture absorption percentage of rubber; the percentage of moisture content of cotton; the percentage of pure rubber in a compound; and qualitative and quantitative analyses of rubber, tin, zinc, and copper . . . There's no compromise here, or in any other corner of our lab. . . . One milligram one way or another doesn't go . . . It's an exact science, with us, this production of wires and cables for practically every known electrical application. On your next job, call in your nearest CRESCENT representative.

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CRESCENT ENDURITE SUPER-AGING INSULATION • WEATHER-PROOF WIRE

Questions on Signalling

Answered by
ALBERT A. SCHUHLER

Resetting on Electrical Reset Annunciators

Q. What is the difference in operation between group reset, individual reset and the automatic reset drop annunciators? Can any two annunciators of the same type be connected in multiple?—O. F.

A. In the group or collective reset type, all drops may be reset simultaneously by means of a push button. Or the resetting may be arranged so that several reset buttons may be used, each one of which may operate a portion or group of the total.

In the individual reset type, each drop may be reset by its own individual reset button, giving the utmost in selectivity in resetting.

In the automatic reset type, no push buttons are required. As a result there is always one drop in the indicating position. The drop will remain in this position until another push button, corresponding to a different drop is pressed. In this case, the first drop returns to its original position and disappears, while the second appears behind the glass opening. Any two annunciators of the same type may be operated in multiple.

Soldering or Not?

Q. I have been advised that it is not necessary to solder wires on low-tension signal systems, due to the low voltages used. What is your opinion? —G.N.

A. Troubles are more difficult to locate on low-tension signal systems than on lighting systems. Much of the trouble may be traced to poor connections, for though upon examination of an unsoldered joint or splice, the wires seem to make contact, current fails to pass certain points.

After a splice or joint is made, the copper gradually becomes oxidized. This chemical action causes a film to cover the conductors, so that the contact becomes defective.

It is, therefore, recommended that all splices and joints in any low-tension signalling device or wiring be soldered. In addition, these points should be properly taped as for lighting work.

Watchman Report and Telephone System

Q. An industrial plant, having a magneto type watchman report system, wishes to add a telephone system, so that the watchman on the routes may speak to the chief watchman when it becomes necessary.

Will you advise necessary wiring required, and also furnish a sketch of circuit for the telephone equipment?—C.O.

A. In this type of system, the watchmen carry portable handphones, which are equiped with rubber insulated flexible cable, and a plug. The plug is inserted in a jack, which may be mounted in a separate plate and placed alongside the present magneto stations. Or a jack may be inserted or mounted in the front plate of the present magneto stations.

The accompanying drawing shows the present wiring in solid lines, and the additional wiring for the telephones in dotted lines. The pilot light at the chief watchman location is used as a signal to indicate that a watchman on a route wishes to speak. This signal shows as soon as a handphone is inserted in an outlying jack station.

Rectifiers for Signal Relays

Q. On a change-over of service from direct to alternating current, it is found that the relays and annunciators which have been operating from a battery will not satisfactorily operate from a transformer, although the voltage has been increased. We want to eliminate the battery if possible. What device may be used to derive the source of power from the a.c. service?—G. H.

A. Dry plate rectifiers are being used with good results in systems of this type. Fully filtered rectifiers will operate relays and annunciators very satisfactorily.

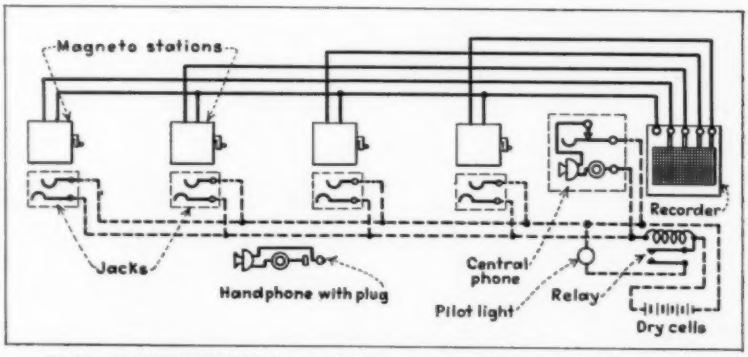
It is not necessary to go to this expense, however, as a 70 per cent filtered rectifier has been proven successful. Non-filtered types do not always operate the relays satisfactorily. Care must be taken to select a rectifier which will carry the entire load, with a minimum drop in voltage.

Fastening Low-Tension Wires

Q. What methods are recommended for fastening individual bell wires along surfaces?—R.J.

A. For supporting signalling wires along surfaces, staples and insulated nails may be used. But where a larger number of wires are to be fastened, straps are better.

Some of the methods used are shown in the accompanying drawing. The square top or coppered staples shown at A and at B, are used to some extent,



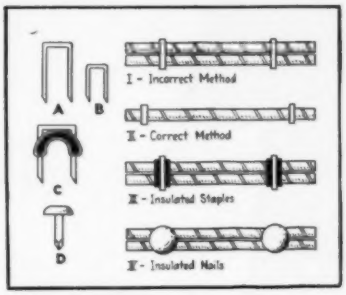
WIRE CONNECTIONS for a telephone system added to a watchman report system for making call-ins from outlying stations.

Questions & Signalling

[FROM PAGE 71]

but care must be taken not to fasten more than one wire under each staple, unless the wires are first protected with a wrapping of friction tape. This is necessary in order to minimize the possibility of a short-circuit, due to the staple cutting through the insulation. The incorrect method is shown at I, and the correct method is shown at II.

Where wires are run closely and parallel to each other, a staple holding



STAPLING METHODS—Several ways to fasten surface signal wires.

one wire should not be placed next to a staple of an adjoining wire. They should be "staggered," as the staple points often touch each other after being driven into the wood, causing short-circuits, if the staples cut through the insulation.

At C is shown an insulated saddle staple, consisting of a square headed staple with a fibre shield placed under the head. This type of staple can be used to fasten two wires as shown at III, without injury to the insulation. The insulated nail shown at D has an insulated head, and a metal stem. This nail is used to support either two single wires or twisted pair or triplex wires as shown at IV.

Selective Talking-Selective Ringing System

Q. "One of our clients has a selective talking-selective ringing telephone system consisting of eleven instruments, but with a capacity of 16 buttons. There are four additional locations where telephones could be used, but these stations are only to act as outlying stations. Each of these four stations is to call one of the present instruments, which will act as a master, and operate the four outlying stations selectively. The present telephones will

THE COLUMBIAN WORLD'S EXPOSITION

Way back in '93 when the then spectacular electrical illumination at the Columbian World's Fair astounded the world—the predecessors of today's Jefferson-Union Fuses were being manufactured....Along with the speedy growth of the electrical industry from that early beginning—improvement and refinement of Union Fuses kept pace.

Dependability is the feature demanded by electrical and production men in this motor power age—unnecessary delays and shutdowns are costly—good reason why Jefferson-Union Fuses are so regularly specified. JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago), Illinois. Canadian Factory: 535 College St., Toronto, Ontario.

JEFFERSON UNION

RENEWABLE FUSES

Questions on Signalling

[FROM PAGE 72]

be required to operate as originally intended.

The system of wiring used is known as common-return type. Can this system be changed to meet these new requirements?"—J.F.

A. The outlying telephones may be added without difficulty. Each instrument must have only one button, which is to be used for calling the master telephone. Four buttons on the master telephone, which are not used at present, may be used for calling the outlying stations.

The present wiring does not require any changes. The only additional wiring necessary will be between the master station and the outlying stations. In most cases, one section wire will be required for each outlying telephone, a total of four. In addition, four common wires must be run between the master station and all outlying stations. A slight difference may be necessary for this extra wiring, depending upon the various manufacturers' products. We would therefore suggest contacting with the original manufacturer of these telephones.

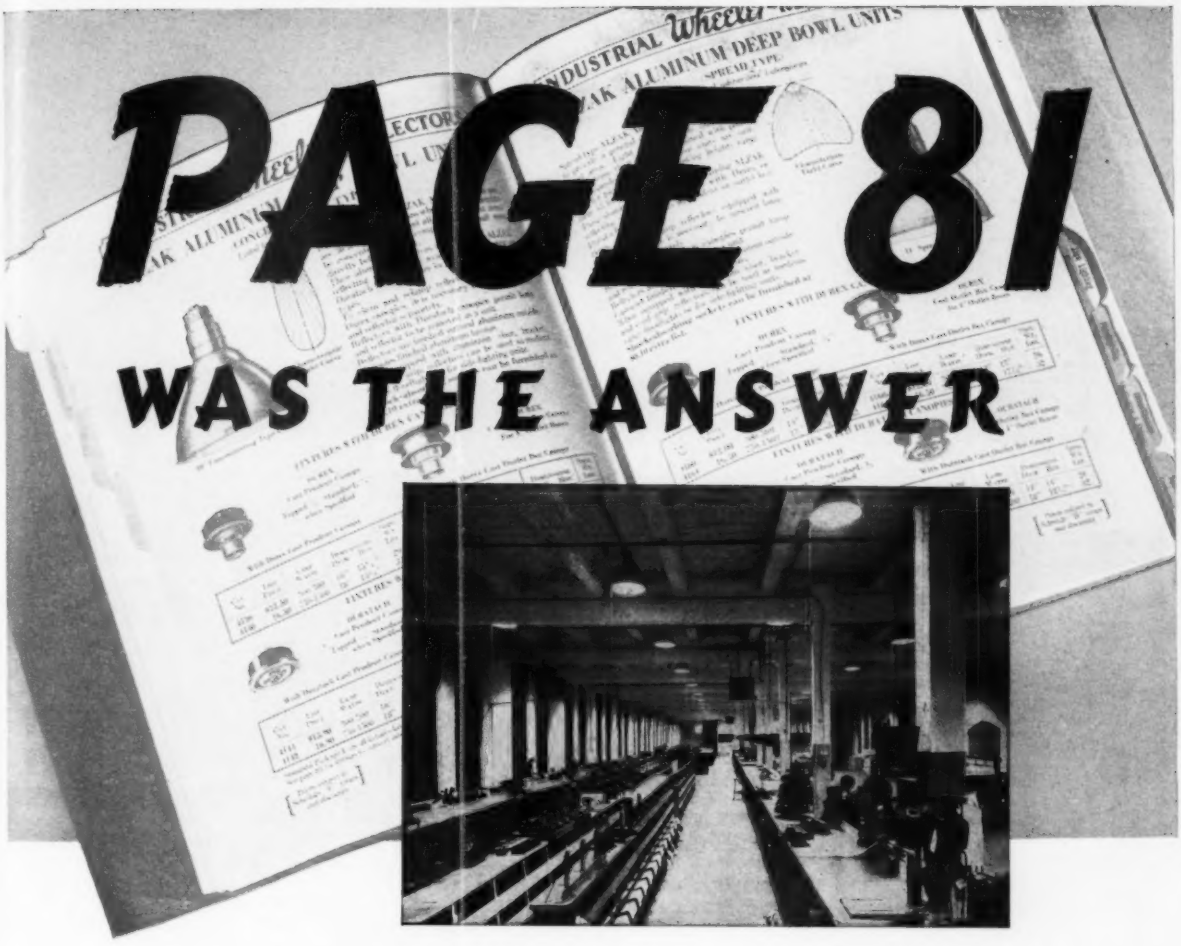
Time Recorder With Nurses Call

Q. *Is it possible to record the time required for a nurse to complete her service to a patient? If so, we wish to add something of this nature to a present nurses call system.*

A low-voltage locking button nurses call system is being used at present. Each floor has a nurses station annunciator to indicate calls from rooms. A supervisory annunciator is now located at present in the assistant superintendent's office. However, it is necessary to watch the lamp indications continuously, in order to obtain a record.—G.Q.

A. An elapsed time recorder may be used to replace the present supervisory annunciator. A pen type recorder may be connected to the wires now leading to the annunciator without additional wiring, or magnetic type of recorder would require proper control equipment in addition to the wiring.

If you desired to use the annunciator with the elapsed time recorder, it will only be necessary to extend the wires from the annunciator to the recorder. In other words, the annunciator and the recorder would be connected in multiple.



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In the News

SWARTZBAUGH RECEIVES MANUFACTURERS MEDAL

Charles E. Swartzbaugh, chairman of the NEMA Business Development Committee, received the James H. McGraw Manufacturers Medal at the Fall Convention of the National Electrical Manufacturers Association, in Chicago, October 27. The citation was as follows—

MEDALIST—Charles E. Swartzbaugh

Charles E. Swartzbaugh, president Swartzbaugh Manufacturing Company of Toledo, long a leader among the manufacturers of domestic electrical appliances, in December 1935 was asked to take the chairmanship of a committee representing all sections of the National Electrical Manufacturers Association and organize a broad program for the development of the electrical market. He prepared a plan that received the unanimous support of the electrical manufacturing industry and proceeded to coordinate and carry forward the various joint promotional activities with which these manufacturers were concerned. This immediately involved his personal attention and attendance upon the work of the Adequate Wiring, Kitchen Modernizing, Electrical Housewares and other programs, then operating or in process of formation and an active cooperation with other national associations of the electrical industry, participating or involved in these movements.

Because of natural and inevitable conflicts of tradition, inclination and interest, between these groups of manufacturers and these several branches of the electrical industry, the stimulation, guidance and supervision of these many related activities called for high qualities of personal leadership. Mr. Swartzbaugh brought to the task a broad knowledge of the market, a rare capacity for clear thinking, an imperturable patience and an unquenchable enthusiasm, that has won him frank friendship and ready support on all sides and accomplished a progress that appeared impossible two years ago.

By his dogged determination and untiring energy, his tactful approach to problems and his inimitable humor and good fellowship, he has overcome one obstacle after another. And by his speaking, his writings and the devotion of endless time to meetings, conferences and travel, cooperating with innumerable organizations, groups and individuals, he has helped to set up practical working agreements between associations, to reconcile overlapping programs and to advance deserving activities. And out of this has come a new recognition among electrical manufacturers of the possibilities for progress through organized market development, based on sound principles and policies.

In recognition of this constructive contribution to the advancement of the manufacturing branch of the electrical industry, the judges have awarded to Mr. Swartzbaugh the Manufacturers Medal and Purse for 1937, given under the James H. McGraw Award.

Mr. Swartzbaugh was selected for this honor by a judges committee consisting of —L. F. Adams, commercial engineer, General Electric Company, Schenectady; Clarence L. Collens, President, Reliance Electric & Engineering Company, Cleveland, Ohio; F. C. Jones, President, The Okonite Company, New York, N. Y.; F. L. Nicholson, Westinghouse Electric & Manufacturing Company, New York and Earl Whitehorne, Secretary, Committee of Awards.

The presentation was made by Howard Ehrlich, executive vice-president, McGraw-Hill Publishing Company, representing the committee of awards.

EASTERN INSPECTORS DISCUSS CODE

Heavy attendance marked the thirteenth annual meeting of the Eastern Section IAEI, held September 27 to 30 in Hartford. The rearranged 1937 Code was the main theme, rounded out with addresses on timely topics. The entertainment program included a banquet.

In addition to a detailed review of the various Code articles, the inspectors' early-morning "code chats" were well attended. A lively competition in the knowledge of common inspector problems was held in the form of a special "intelligence quiz," with a set of statements furnished each entrant to be checked as true or false.

G. D. Munger, Director, Utilization Division of REA, received rousing applause for expounding the administration's attitude toward safe procedure backed by effective inspection, in wiring the farmsteads of America. He stressed the need for wiring farms so that every kind of equipment in farm use may be operated safely and efficiently on the system. He pointed to the need for a broad organization of qualified inspection facilities to assure farms the same standards of electrical safety that are now enjoyed where inspection services have already been operating.

New views as to limitations in the current carrying capacities of conductors were presented in detail by Sam. Rosch, chairman of the Committee on Wire Insulation Research, of NEMA. A sound motion picture film on various tests conducted by

BETTER SIGHT—MIGHT: *Archer vied with golfer at the 31st Annual Convention of the Illuminating Engineering Society, White Sulphur Springs, West Va. Karl Staley, the William Tell of the New York Section, attached a golf ball to an arrow with adhesive tape to vie with the driving ability of A. S. Turner, Jr., of the Philadelphia section. G. B. Regar, retiring president of the I.E.S. is standing at the right of golfer Turner.*

"DE-ION MEANS LESS UPKEEP TO ME", SAYS THE ELECTRICIAN

● Ask any electrician who has had experience with the new Westinghouse Linestarter what the word "DE-ION" means to him. He'll tell you it means lower cost installation and upkeep. First, it cuts installation costs because of ample wiring room, with all terminals "easy-to-get-at." For routine inspection all parts are fully accessible from the front. Long time trouble-free performance is further assured by a balanced sturdiness of design—both *electrical* and *mechanical*. For details call or write your local:

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Operators, plant owners and machine designers join with electricians in praise of these "De-ion" benefits found *only* in Westinghouse Linestarters.

Westinghouse "DE-ION" LINESTARTERS

In the News

[FROM PAGE 76]

Underwriters' Laboratories, was presented by A. R. Small, president of the Laboratories.

Other speakers were Max Gysi of Brooklyn, N. Y. who discussed the Handbook of Interior Wiring Design, and M. M. Brandon, Electrical Engineer, Underwriters' Laboratories, who discussed the effect of heating on electrical equipment.

Among the suggestions made for future Code revision was a resolution requesting more identification labels on conduit to prevent the substitution of non-electrical pipe in less than standard lengths.

An educational exhibit on motor circuits and their control which was provided by a manufacturer presented a most complete arrangement of this complex subject. Switches and controllers were installed on a large wall display board, with all wiring interconnections diagrammed in detail together with the various 1937 Code sections keyed to each part of the display. Interesting booths were arranged on two exhibitor floors to display and demonstrate new equipment of various manufacturers.

New officers are—J. S. Zebley, Washington, president; A. L. Holbrook, Waltham, Mass., 1st vice-president; J. Hagendorn, New York City, 2nd vice-president; Allen Hopkins, Springfield, Mass., treasurer; and F. N. M. Squires, New York City, secretary.

SOUTHERN CALIFORNIA OFFICERS

The Electrical Contractors Council, Inc., comprising a membership of 36 of the larger operators in Southern California elected the following officers and directors for its second year of operation, at a recent annual meeting:

J. E. Chandler, Chandler Electric Co., president; G. E. Arbogast, Newbery Electric Corp., vice-president; C. T. Smallcomb, Smallcomb Electric Co., treasurer. Directors: R. R. Jones, Jones Electric Co.; George L. Patterson; Victor B. Sayre, Commercial Electric Co.; and George DeAth, Peerless Electric Co.

The organization operates under a voluntary agreement of fair competition. Membership in NECA is the primary requirement for membership in the council.

OHIO CONTRACTORS MEET

Code changes, profits, insurance, and licensing laws were brought before the ninth annual convention of the Ohio Electrical Contractors Association held in Cleveland, October 5-7.

The revised National Electrical Code was discussed by F. O. Evertz, of the Ohio Inspection Bureau. Wm. G. Hazel of Cleveland discussed the building of trade associations and the part that overhead costs and fair profits represent in billing the customer. Insurance problems were outlined by H. A. Davis, of the Ohio Construction Council for Safety and Compensation Insurance. He discussed the alarming increase in compensation costs and urged cooperation in reducing accidents and in preventing fraudulent claims. R. M. Anderson of the Ohio Industrial Commission outlined the work being done to eliminate "chiseling" on payroll estimates.

Other speakers explained unemployment insurance; the advantages and pitfalls of state inspection and licensing under Michigan's state licensing law; the new Cleveland electrical code, and relations existing between I.B.E.W. and the Ohio contractors. A trip to Nela Park was a feature of the entertainment program.

Officers reelected for 1938 were: Wm. E. Raney of Cleveland, president; A. B. Weinfeld of Columbus, first vice-president; C. E. Loomis of Akron, third vice-president, and C. F. Hammer of Toledo, secretary-treasurer. Paul Schath of Cincinnati was elected second vice-president.

"Could you stick a floor plug right here, electrician? We'd kinda like to make some toast for lunch."

COMING MEETINGS

National Warm Air Heating and Air Conditioning Association—New York City, January 24-26, 1938
American Institute of Electrical Engineers—New York City, January 24-28
International Heating and Ventilating Exposition—New York City, January 24-28
National Electrical Manufacturers Association—Waldorf-Astoria, New York City, February 6-11

CONOVER HEADS LEAGUE GROUP

The second annual conference of the International Association of Electrical Leagues was held in New York City on October 6 and 7. Attendance at the conference was swelled by members of the industry who came to hear prominent speakers discuss important topics at the several open sessions.

The new officers elected for the IAEL are: President, G. R. Conover, Managing Director, the Electrical Association of Philadelphia; vice-president, A. A. Gray, Manager, The Electric Association, Chicago; treasurer, G. W. Weston, Secretary-Manager, Electric & Radio Association of Kansas City; secretary, O. C. Small, Director of Business Development Department, National Electrical Manufacturers Association, New York.

NEW YORK LICENSING NO PUSHOVER

Written examinations were recently held in the city of New York for Master and Special electricians' licenses, with the following results:

Called for examination	144
Examined	129
Absent	15
Passed (Master)	16
Passed (Special)	8
Failed	105

Applications must be filed in advance of examination dates, accompanied by affidavits that substantiate the applicant's statement of experience.

OHIO SPITE-LINE TROUBLE

Disputes between public utility companies and rural electrification cooperatives in Ohio culminated in violence when a group of about 300 cooperative sympathizers recently tore down approximately a mile of line newly erected by the Lake Erie Power Company in Huron County. According to reports, the line had been hastily put up to parallel a line staked out by the North Central Rural Electric Cooperative along which poles had already been distributed ready for erection. Its effect, it is charged, would have been to isolate 50 members of the cooperative.

In the News

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The linemen were reported still at work when a group of about 300 men, women and children started to pull the poles from the ground or chop them down with axes. One lineman was slightly injured when a pole was felled before he could climb down, and another was rescued by the sheriff after being marooned on a pole top for some time.

OFFICERS ELECTED ALAMEDA COUNTY

A. R. Matson, Matson Electrical Equipment Company, Oakland was elected president of the Alameda County Electrical Contractors Association at its annual meeting recently. William Bernhardt of Bradshaw Electric Company, Berkeley, was named vice-president and E. A. Chloupek of the California Electric Co. Inc., secretary-treasurer again.

The only other committee appointed was on labor relations—Walter Spencer, Dan Bronson, T. O. Rosenberg, Gus Krolls, Wm. Bernhardt and A. R. Matson.

J. M. CLAYTON DIES

Following a three-months' illness, Joseph M. Clayton, 58, one of the south's most widely known electrical contractors, died Saturday, October 2nd. He was president of the J. M. Clayton Company, and president of both the Georgia and the Atlanta Electrical Contractors' Associations. He was also chairman of the electrical industrial promotion committee of the Southeastern states.

Joseph M. Clayton

F. J. FISHER DIES

Frederick J. Fisher, pioneer electrician and electrical contractor in San Francisco died September 10, 1937. Long associated with theatrical and amusement business, Mr. Fisher started as an electrician some 40 years ago. He invented a number of spectacular stage acts involving electrical apparatus.

BALTIMORE OPINION ON LICENSE PEDDLING

An important opinion has been handed down by Herbert R. O'Conor, Attorney General of Maryland, holding that the purpose and spirit of the law are violated when electrical work is done in Baltimore by building contractors who hire master electricians for the sole purpose of obtaining permits from the city and making periodical inspections. The opinion was given in response to a request from the State Board of Electrical Examiners and Supervisors.

The term "direction and supervision" in the law, according to the opinion, means that the master electrician actually must direct and supervise the work. "The statute is not gratified," it is stated, "when a master electrician merely lends his name to a contract for the purpose of obtaining the permit. Of course, there must be some elasticity in the application of this term; and common sense and ordinary business judgment must control your Board in passing upon the facts of each case. We do not mean, for instance, that the master electrician must be physically present during the entire period of the installation; but we think the statute is not gratified unless the master electrician actually lays out the work for his subordinates and directs the installation in all of its material aspects".

In conclusion Mr. O'Conor states that the license of the master electrician may be revoked if the Board finds that the law is being violated.

MONEY FOR NEW SCHOOLS

Recent presidential approval of allotments for 350 school projects totaling $21,267,963 was announced by P.W.A. The total construction cost of these schools is estimated to exceed $47,000,000, designed to do away with hazardous school buildings. This program of demolition, replacement and renovation of old buildings is widely scattered, and should therefore interest a large number of electrical contractors who do public work.

VANCOUVER REQUESTS LICENSING

It begins to look promising for the licensing of electricians in Vancouver, B. C. The city council, acting on the proposal of members of the Vancouver Electrical Association, has recently instructed its corporation counsel to prepare an amendment to the charter for approval by the provincial Legislature. The plan is exactly the same as plumbers have now.

All masters and electricians would be required to obtain licenses by appearing before an examining board. Suggested personnel of the board is the provincial electrical inspector, city electrician and a member of the trade.

Respect for Hot Stuff

Electrical safety lies in cleanliness, believes Emile E. Goulet of the firm Goulet, Ltd., Quebec. So with customers who operate private transformer stations, Mr. Goulet constantly preaches "clean-up and paint-up," to keep their transformer and switchboard rooms free of rubbish. This discourages the dangerous habit of using such spaces to store miscellaneous junk.

FROM BRASS-TOWN — Waterbury, Conn. is called the Brass City, which implies industries. And Ralph J. Vaughn of Clapp, Rose & Vaughn makes it his job to look after a bustling industrial contracting business. Others manage this company's sales of appliances and home heating equipment, which resulted in some 200 oil burner wiring jobs last year as fill-ins for Mr. Vaughn's crews.

Selling Sound

Orders can slip away from a contractor to other channels unless he has an ear to the ground, says L. P. Harvey of Schoolfield-Harvey Electric Co., Charleston, W. Va. A local furniture concern was about to lease a paging system for $80 per year from the local telephone company. This would have meant a $100 wiring job for Harvey—perhaps. So he sold them a 20-code 6-station system and that meant a $350 order instead—and everybody is happy.

Standardized Selling

Industrial contractors serve the best interests of the customer and themselves when they advocate the standardization of electrical equipment in factories, says E. H. Kotz, successful proprietor of the Electrical Motor Repair Co., Trenton, N. J. He cites as an example one local factory where this recommendation has brought him steady orders for some 200 new motors, all of one make, with controls.

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Now, there is further assurance of Better Light and Lower Maintenance Costs through the specification of RLM labeled reflectors.

With the same exacting laboratory and engineering tests as were employed in establishing quality standards for the Dome Reflector, THE RLM STANDARDS INSTITUTE has now set up similar standards for the Symmetrical Angle and Deep Bowl Reflectors.

Thus, today, the RLM LABEL as a certificate of uniform quality and a warranty of conformance to quality standards, means more than ever before to buyers and specifiers of Lighting Equipment.

Basically the RLM LABEL stands for:

1 MORE LIGHT AT NO EXTRA COST
Efficiency specifications are 10-12% higher than average reflector efficiency.

2 BALANCED LIGHTING
Proper distribution and adequate diffusion are just as important as the amount of light. RLM Specification Porcelain Enamel has no known equal as a reflecting surface for Balanced Lighting.

3 LOW REPLACEMENT & MAINTENANCE COST
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To insure uniformity of quality and conformance to RLM Specifications, inspections and tests are continuously conducted by the Electrical Testing Laboratories of New York, an independent Testing Organization.

For further information about RLM Reflectors and a copy of the RLM Standards Specifications for Dome Reflectors, you are invited to communicate with any of these manufacturers of RLM Standard labeled reflectors. The letters RLM mean Reflector and Lighting Equipment Manufacturers.

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OVERBAGH AND AYRES MFG. CO.
Chicago, Illinois
QUADRANGLE MFG. COMPANY
Chicago, Illinois
SMOOT HOLMAN COMPANY
Inglewood, California
WESTINGHOUSE ELECTRIC AND MFG. COMPANY
Cleveland, Ohio
WHEELER REFLECTOR CO.
Boston, Massachusetts

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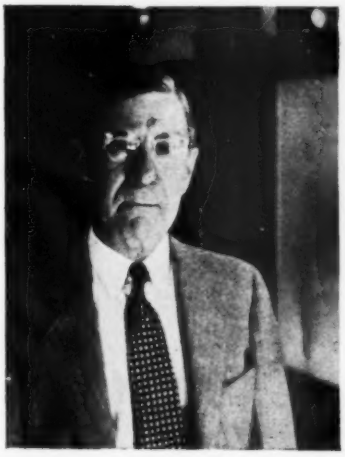
No Gin Fires

Cotton gins are an important item in the service shop volume of R. H. Haile, Columbia, S. C. Motors ranging from 30 to 75 hp. are used for this work, generally of the wound-rotor standard open frame type, despite the heavy accumulations of lint and dust. Mr. Haile takes pride in having kept his customers free from fires as he is always after them to clean their motors, isolate them, or provide approved types.



ALSO ROMANCE—R. S. Glover, industry veteran and manager of Garrett, Miller & Co., Wilmington, Del., does not discuss that city's recent DuPont-Roosevelt wedding. But he will tell interesting things about the $22,000 wiring job just done by his firm in the 205-ft. E. I. DuPont Memorial Tower. Here was a job—with chimes, organ, elevator to observation tower, and various innovations in electronic lighting and heater controls.

Strange Bedfellows

Among the impressive assortment of reconditioned apparatus to be seen on display at the Electric Maintenance Service Co. in Bridgeport, Conn., are some huge gear motors. These came all the way from Chicago's famous Century of Progress Sky Ride. Alongside these brutes rests a large Diesel-powered generator from Seattle.

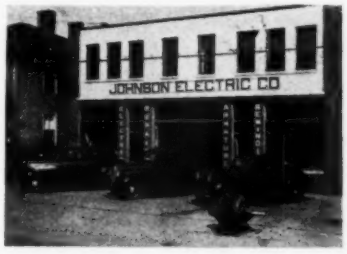
Lighting the Town

Portland, Maine boasts of some up-to-the-minute store and window lighting, and it seems E. S. Boulos of the E. S. Boulos Co. is the chief promotor. Getting under way several years ago, Mr. Boulos has been a hard plugger for lighting up the town, and his persistent effort has brought in a lion's share of the prize jobs along Congress Street.

More Gossip

To Assist Associations

J. R. Lazarus, manager of the Better Business Bureau in Fresno, California, has been appointed as central division field manager for The Pacific Coast Electrical Bureau in Fresno. He will assist contractor organizations in trade association work, and promote standard electrical ordinances and appliance sales regulation in the San Joaquin Valley and the midland coast counties. Red Seal inspection will be carried on by power company engineers. Mr. Lazarus succeeds the late Herbert W. Stitt who died in December 1936.



SHENANDOAH EXPERTS—*Down in the historic Shenandoah Valley of Virginia, the Johnson Electric Co. of Staunton takes care of motor repairs and installations for mines and other industries. Lined up before this company's modern quarters we get a glimpse of its brand new rolling stock. The large slip-ring motor placed up front seems about as spick and span as the company's transportation equipment.*

Our Lady Secretaries

Visitors to the Cincinnati Electrical Association office always enjoy meeting Katherine Lanier, charming and efficient secretary of the Contractors Division. But now the news is out—Katherine has been married for four years. She only recently announced her marital status when tendering her resignation. Frances Rouiller takes over the contractor's office affairs, and Katherine has gone to Los Angeles with her husband.

Reach Out

City electrical contractors' license systems should be extended to include the entire county, according to F. M. Kienz, secretary of the Utica (N. Y.) Electrical Contractors Association. In that city the license system has effectively controlled wiring installations, within the city limits. But, the worst examples of inadequate and poorly installed work have always been in the outside territory. Until a state license system is effected, an extension of the city regulations to include the county would go far to improve conditions.

Too little have we valued the load of responsibility which electrical wiring bears. Yet it delivers our electrical comfort without stint or hesitance... In these modern days the name GUARDIAN *is that by which* QUALITY *is specified.*

GUARDIAN

FLAME-RETARDING • MOISTURE-RESISTING

BUILDING WIRE

BRAIDED OR LEADED • COMPLETE SIZE RANGE • STOCKED AND SOLD BY ELECTRICAL WHOLESALERS EVERYWHERE

Manufactured by GENERAL CABLE CORPORATION
Sales Offices: Atlanta, Boston, Buffalo, Chicago, Cleveland, Dallas, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, Rome, San Francisco, St. Louis, Seattle, Washington, (D. C.)

GENERAL CABLE

More Grist

False Economy

To install ½-in. conduit for an explosion-proof job saves only about $2 per 1,000 ft., says O. Sweningson of the Sweningson Electric Co., Chicago. Therefore his company uses not less than ¾-in. As a result the hubs of all fittings are standardized for this size and there is no time lost in fooling with reducers or picking out fittings that have the correct hub combinations. To permit future extensions, fittings with spare plugged hubs are installed wherever possible.

GONE MONTREAL—Coming to Montreal as engineering supervisor of the electrical installation for the $19,000,000 Sun Life Assurance Building, Joseph P. Gregory just couldn't break away. Today he engages in electrical contracting on his own and does well on the smaller types of commercial work. His firm is now modernizing the insurance company's original quarters, a 60-year-old office building.

Propellor Lighting

In line with modern industrial demands for higher lighting intensities, the Baldwin Stewart Electric Co., of Hartford, recently completed an installation of 487 high intensity mercury vapor units in an airplane propellor factory. Mounted at 14 feet, on 16 foot centers, these units gave 39 foot candles of general illumination in the production area.

Back for More

A repeat order, even though not so large, gives undisputable evidence of a good initial job. E. J. Dawson's Sterling Electric Co. of Cumberland, Md., recently completed a $50,000 high school contract. The firm was later awarded another smaller order to furnish and install the auditorium and stage control board and lighting apparatus. This made it a 100 per cent Sterling job.

Send for this NEW DATA

This recent literature, issued by leading electrical manufacturers, has been listed by number for your convenience. Please check on the post card any of this material you would like to receive. It will come to you without cost or obligation.

CENTRIFUGAL PUMPS

1. Bulletin 4640 describes a vertical, close-coupled motor-driven centrifugal pump for general service in deep or shallow wells. Fairbanks, Morse & Co.

FIRE PREVENTION

2. A booklet entitled "Preventing Welding and Cutting Fires." Includes safe and sure rules to follow for preventing possibility of welding or cutting fires. Linde Air Products Company.

TREE WIRE

3. Publication C-36 describes Duncord tree wire. Includes abrasion, melt, drip, bend and moisture tests and tables on insulation thicknesses. Anaconda Wire and Cable Co.

RURALINE MANUAL

4. A 74-page manual listing and describing complete requirements for rural line construction. Includes many drawings as a guide for general construction practice. Oliver Iron and Steel Corp.

BRAZING ALLOY

5. Bulletin 10 covers "Easy-Flo," a brazing alloy that penetrates quickly, makes strong, sound, neat joints and avoids damaging metal structures. Handy & Harman.

CIRCUIT BREAKERS

6. Bulletin GEA-2406A describes Type FKO-227 outdoor oil-blast circuit breakers. Gives features, construction, operating mechanisms, ratings and dimensions. General Electric Company.

INSULATING MATERIAL

7. A 20-page catalog on bonded mica insulating material. Includes description of manufacture, uses, specifications and sizes. Many photographs. Continental Diamond Fibre Company.

FIRE ALARM SYSTEM

8. A 38-page book entitled "Vitaguard." Describes fire alarm system for volunteer fire departments and industrial plants. The Gamewell Company.

DIRECT-READING OHMMETERS

9. Bulletin 1540 outlining direct-reading ohmmeter instrument for rapid measurements of insulation and conductor resistance in factory, shop or laboratory. Includes specifications and prices. James G. Biddle Co.

DISCONNECTING SWITCHES

10. Bulletin GEA-1327B covering indoor disconnecting switches with silver line-pressure contacts, Type LG-118. Describes economy features. General Electric Company.

ELECTRICAL EQUIPMENT

11. Catalog No. 37 gives detailed information and pictures on attachment plugs, circuits, transformer cabinets, fuses, switches, panelboards, receptacles, service equipment, switch boards, toggle switches. Metropolitan Electric Mfg. Co.

LABORATORY EQUIPMENT

12. Booklet 841 consisting of 28 pages of information for use of institutions in preparing specifications for new laboratory installations or enlargements of existing facilities. It is called "Suggested Specifications for Electrical Laboratory Equipment." Westinghouse Electric & Manufacturing Co.

INDUSTRIAL LIGHTING

13. A Handbook ML6 on localized lighting for industrial needs. Descriptive material and photographs of supporting arms, reflector assemblies, base attachments, single arm, double arm and canopy lighting units, localite accessories and parts. Also efficiency comparison charts. The Fostoria Pressed Steel Corporation.

RADIO TRANSFORMERS

14. Catalog 372-R on radio transformers and chokes. Contains data on all types of transformers and filter, swing and plate chokes, tables giving dimensions for radio replacement power transformers with a guide giving transformer requirements for nearly 2000 receiver sets. Jefferson Electric Company.

INDUSTRIAL PRODUCTS

15. A 64-page industrial products catalog. Contains information and recommendations on high and low temperature insulations for every industrial need. Profusely illustrated. Form GI-6A. Johns-Manville.

TRANSFORMERS

16. A bulletin broadside on transformers. Illustrations show 14 various types of transformers. R. E. Uptegraff Manufacturing Co.

NO POSTAGE NEEDED

"Knowledge is power." Know the developments in your field. Circle the numbers of the items you want on reverse side of this card and mail today.

Postage Will Be Paid by Addressee

No Postage Stamp Necessary If Mailed in the United States

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 64, SEC. 510 P. L. & R. NEW YORK, N. Y.

ELECTRICAL CONTRACTING

330 West 42nd Street

30th Floor **New York, N. Y.**

FLOODLIGHTS

17. Bulletin No. 1 introducing Omnilite, an all purpose line of floodlights for indoor and outdoor uses. Also an outdoor bracket and portable line. Electric Distributing Company, Inc.

SODIUM INSTALLATIONS

18. Bulletin GEA-2541 features sodium lighting on the San Francisco-Oakland Bay Bridge. Pictures, diagrams and facts on sodium lighting. Also other highway lighting installation pictures. General Electric Company.

CONTROL INSTRUMENTS

19. Bulletin No. 3707 describes three new models of Chronologs, production control instruments. Information on use and operation. Also describes a line of super-sensitive line voltage switches and solenoids. National Acme Company.

LIGHTING EQUIPMENT

20. Catalog No. 81 consisting of 32 pages of mercury vapor lighting equipment. Lists characteristics of mercury lamps, operation, specifications. Many illustrations of equipment and installations. Distribution curves and lamp size and intensity chart, mounting and spacing chart. Goodrich Electric Company.

UNDERGROUND CABLES

21. Bulletin UC-2 describes Trenchlay and Ruralay concentric type cables for direct earth installation on single phase systems. General Cable Corporation.

TOGGLE BOLTS AND ANCHORS

22. Catalog No. 52 describing and illustrating toggle bolts, expansion anchors, switch boxes, clamps, hooks, staples, straps, adjustable radiator bracket, lag screw drills, washers and special purpose products. The Paine Company.

CAPACITORS

23. Catalog No. 143 describing new line of capacitors for power factor correction on electric distribution systems. Cornell-Dubilier Electric Corporation.

A.C. WELDERS

24. Catalog Section 26-320 describing features, construction and application of midget marvel flexarc welder. Specifications and operating costs included. Westinghouse Electric & Manufacturing Co.

CIRCUIT BREAKER DATA

25. An 8-page illustrated folder on circuit-breaker data. Covers particularly precise protection afforded by non-thermal fully-magnetic Re-Cirk-It breaker, available in instantaneous-trip and time-delay actions. Heinemann Electric Co.

MERCURY SWITCHES

26. A 12-page bulletin describing line of Kon-nec-tor mercury switches. Features illustrations of twelve common types of mercury-to-mercury and mercury-to-metal switches. Table shows capacity and electrical specifications. General Electric Vapor Lamp Co.

SOLDEROMETER

27. A bulletin describing Solderometer, a tool for the indication and determination of tin content of molten wiping metal, especially as related to field operations in connection with cable splicing. Waterbury Cable Service, Inc.

MEGGER TESTER

28. Bulletin 1545 outlines the midget "Megger" tester for testing electrical insulation resistance. Lists application and uses, also illustrations. James G. Biddle Co.

PYROMETERS

29. Catalog No. 1102 describes complete line of potentiometer pyrometers—indicating, recording and controlling. Includes new Electr-o-Line controllers and proportioning control system. Brown Instrument Company.

HARD FACING MATERIAL

30. A folder entitled "Steel Hard Facing Procedure" presents detailed instructions for applying hard facing material to steel wearing surfaces. Illustrations, sketches and a simplified step-by-step procedure. Linde Air Products Company.

ARC WELDER

31. A folder entitled "The Characteristics of a Modern Arc Welder." Includes volt-ampere curve analysis for general welding, heavy welding and light-gauge welding. Harnischfeger Corporation.

MILLITE LIGHTING UNIT

32. A catalog section describing Millite lighting unit for extreme service conditions in industrial plants. Includes dimension outlines, list prices and light distribution data for various spacings and mounting heights. Westinghouse Electric and Manufacturing Company.

NETWORK CABLE

33. A folder describing network cable for low-voltage secondary distribution circuits, leaded and nonmetallic types. Bulletin GEA-1885A. General Electric Company.

DUPLEX POWER PUMPS

34. Bulletin 6130 describing a line of duplex power pumps for oil field service, fire protection and general service requiring pressures up to 800 pounds per square inch and capacities to 187 gallons per minute. Fairbanks, Morse & Co.

RURAL TRANSFORMERS

35. A folder on rural line transformers, including illustrations, diagrams, description, prices and specifications, dimension tables. Standard Transformer Co.

REGULATOR

36. Bulletin GEA-2150A covering direct-acting generator-voltage regulator, Type GDD for direct-current machines. Includes details on construction and design, mounting and installation, operation, illustrations and diagrams. General Electric Co.

CIRCLE NUMBERS-SIGN-AND MAIL

ELECTRICAL CONTRACTING November
(Not good after February 1)

Please send me, without obligation, manufacturers' literature herein described and identified by numbers circled below.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36

NAME..... TITLE.....
Please Print

COMPANY .....
Please Print

ADDRESS .....
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CITY .....STATE .....

Please note that there is a charge for the following pamphlets. Send for them direct to the Association.

CONTROL STANDARDS AND TRANSFORMERS

Two new publications—the Industrial Control Standards, No. 37-44 and Instructions for Care and Operating of Transformers, No. 37-46. First one covers industrial control equipment and includes all material that was in previous publication and all changes and additions that have been made up to date. Price 60 cents. Second pamphlet deals with instructions for care and operation of transformers, both distribution and power. Price 25 cents. National Electrical Manufacturers Association, 155 East 44th Street, New York, N. Y.

only a bad job but an unmerciful ribbing at the hands of fellow wiremen. Thus the co-op jobs usually pass inspection with the minimum two visits of the inspector.

There are few established contractors in the area, who are attempting to reach the farm wiring market. Old time wiremen and handy men of unknown training are taking over some of the farm work. These are by far the worst offenders from the inspector's point of view, for as many as six calls are often required before defects are corrected.

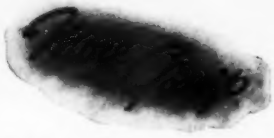
Fitted to Work

The answer to this, according to James Van Pelt, is that the co-op boys have had a specific training for the type of work they have to do. They know no short cuts or trick circuits, and a good job is more important to them than keeping the labor cost down. "They just don't know how to do it wrong," he says. Such defects as gas pipe conduits, hot go-betweens, hot socket shells and skimped wire sizes are rare on the co-op jobs. The boys have studied the code and follow it to the letter.

There is every evidence that these Indiana co-ops are doing their best to install a safe, adequate wiring job. There is much that may be criticized, however, in their operating methods, the low wage rates and the lack of rounded training for the wiremen. To many members of our industry, the short period of instruction is an outstanding defect in the set up, but the co-op counters with the claim that the type of work being done requires only a very limited knowledge of electrical work.

It is a Start

The inspection technique they are following, would be considered very inadequate by a trained city inspector. It is a sincere start, however, and improving constantly, and a big gain over no inspection at all, a condition only too prevalent in the country's rural areas. Also, there is nothing in this picture to bar the legitimate contractor from the farm wiring field. The effort that the co-ops are making to do a good job indicates that there is a place for the well organized and financed electrical contractor with crews of expert wiremen. He would find the competition less severe than in many urban districts.



Shop-Engineer Training

Every large motor shop has engineering problems, both in routine production and in field sales work. So W. A. Landry of the Montreal Armature Works, Ltd., encourages Canadian engineering students to come into the fold for practical experience. This practice works out to a double advantage. If the motor business proves interesting. Landry has acquired another engineer, thoroughly trained for shop or sales work. Furthermore, should some industry take on one of his proteges, the friendly tie often is helpful in future business dealings with that industry.

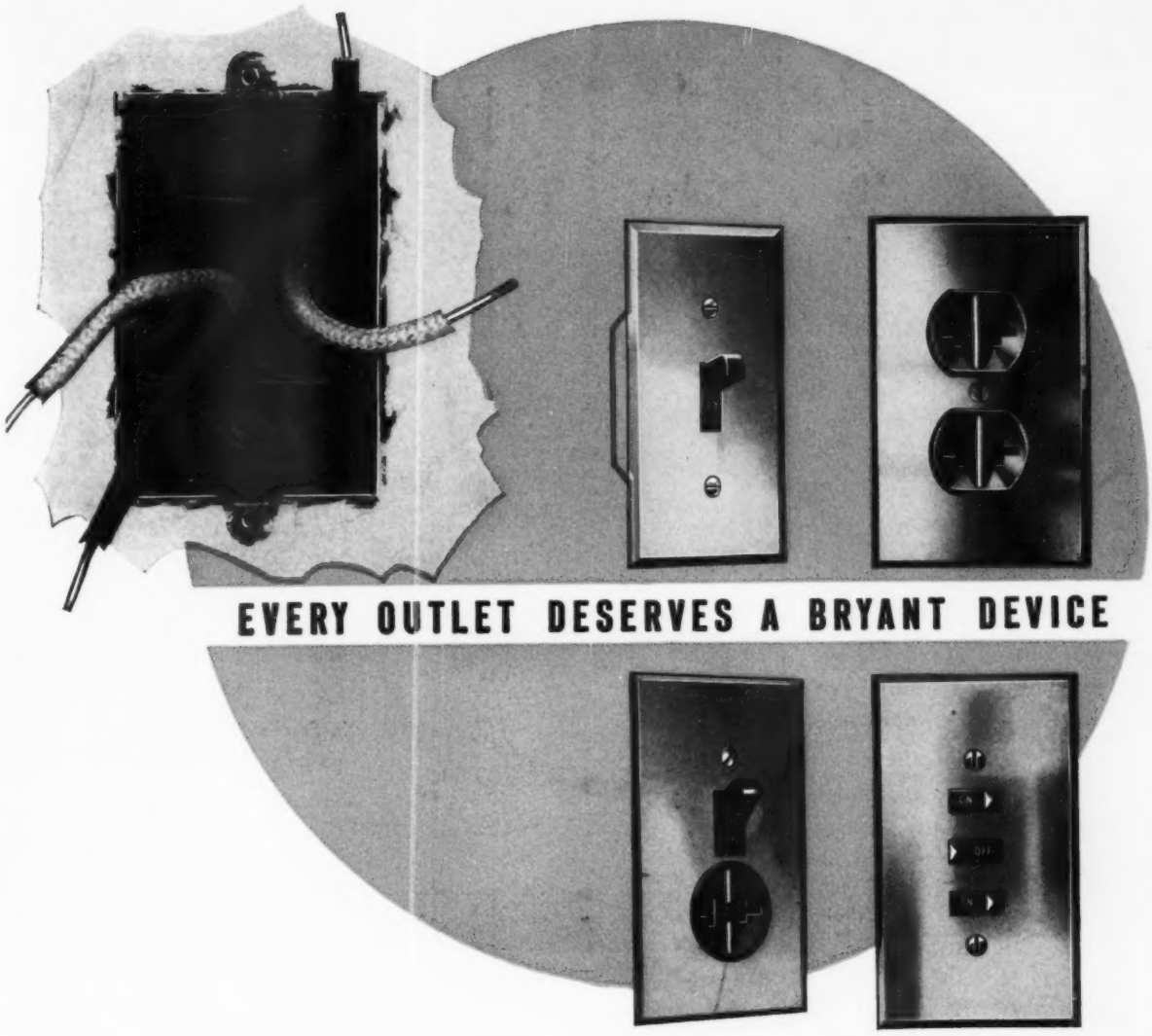
***MASS PRODUCTION**—On September 1, the company's tenth anniversary, more than 100,000 small motors will have been reconditioned on the mass production lines of the Electric Refrigerator Motor Co., Inc., of Philadelphia. With a branch shop in Chicago, and others scheduled to open in New York and Boston this fall, George C. Tatem (left) president of the company, feels justified in having pioneered the mass reconditioning of small motors. Henry Weirich (right) and Wm. Weirich (center) are officers in the company. Henry has specialized as developer of the "Ermstat" over-current protective device for small motors, which is handled by an affiliated company.*

Bridged Wiring Deluxe

What looks like a suspension bridge running between factory buildings at a plant in New Haven, Conn., is really a large outdoor assembly of enclosed busbars that were suspended on a catenary network of steel cables. Robert Castro is the proud installer of this novel construction method.

Slow Death

Frank T. Greenwalt of the Greenwalt Electric Supply Co., Hagerstown, Md. swears by all that's holy that small 40-outlet homes in that community are being wired in non-metallic and armored cable for as low as 75c. per outlet. This flat price includes the service entrance, all wiring devices—but Thank Heaven! not the lighting fixtures.



EVERY OUTLET DESERVES A BRYANT DEVICE

Bryant DEPENDABILITY guards your reputation

BRYANT
WIRING DEVICES

Sold Through Electrical Wholesalers

Dependable installations speak for themselves. They bring *repeat* business and create *new* business through satisfied customer endorsements.

Bryant and Hemco wiring devices are made for dependable, enduring service and are increasingly in demand. Contractors particularly are standardizing on Bryant devices. Your Bryant easy-to-use catalog will show you why.

THE BRYANT ELECTRIC COMPANY • BRIDGEPORT, CONNECTICUT

NEW YORK: 100 East 42nd St. • CHICAGO: 844 West Adams St. • SAN FRANCISCO: 325 Ninth St.

Marine Work

The firm of J. A. Y. Bouchard in Quebec serves on land and water. J. M. Paquet, engineer, reports several Diesel plant installations, also complete refrigeration systems on two Coast Guard cutters for the Royal Canadian Mounted Police.

Home Service

Not content with wiring and fine fixtures alone, the firm of C. W. McCaulley & Son, Inc., at Wilmington, Del., also operates a tile contracting department. The display of fancy tile creations blends nicely with its choice pieces of lighting equipment.

ON MAIN LINE—Whizzing on the Pennsylvania from New York into Philadelphia, you pass a goshawful big building with its roof and sides lettered George Sachsenmaier Co., Holmesburg, Pa. This is where one of the country's leading motor and generator equipment dealers holds forth and keeps stock. Meet Henry F. Sachsenmaier, the man who keeps a weather eye on the shop and an inventory of about $200,000 in ready-to-go apparatus.

Telephone Advertising

Every electrical contractor knows the importance of an adequate listing in his local telephone directory. Many contractors have also learned the importance of using extra line listings or display advertisements in those directories. Here are some of the phrases and ideas used in such advertising in current telephone directories.

Wilson Electric (Omaha); "Dependable Wiring and Repairing. House—Store—Electrical Fixtures. City-Wide Service."

Bigby Electric Co., Inc., (Tampa, Fla.); "Electrical Installations Construction and Repairs—We Do It Right."

Springfield Electric Co. (Springfield, Heavy Construction and Factory Work a specialty—Motor Installation and Wiring."

Luke C. Meehan (Springfield, Mass.); "Electrical Contractor—I Specialize in Old House Work—Satisfaction Guaranteed."

Electric Service Co. (St. Petersburg, Fla.); "Electrical Contractors—Call Us For Any Electrical Construction. Night Phone."

Brown Electric Co. (Fort Smith, Ark.); "Call Us—We go anywhere any time."

Levy-Morton Co. (Columbus, Ga.); "Residential—Commercial Electrical—Serving Columbus for 25 Years—Lighting Fixtures."

Friedman Electric Co. (Belleville, Ill.); "Repairing on Anything Electrical—Commercial — Industrial — Residential — Live Wires."

Cecil Cross (Fall River, Mass.); "Wall Plugs Installed Without Disturbing Floors."

Trade Promotion

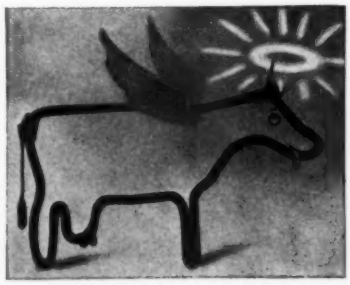
Electrical contractors, here and there, have gone in for air conditioning work with varying success. In Charleston, W. Va. the firm of Rosenblatt & Hunt does a good job of it and backs its sales with liberal for publicity. A recent special edition of the local daily newspaper which announced the opening of a remodelled store, included a full-page ad by Rosenblatt & Hunt that told of their air conditioning installation.

Up in Smoke

There are too many needless losses from improper electrical work in hazardous locations. Chisellers and incompetents stand in the way. According to one of the outstanding insurance engineers, whose job it is to inspect and engineer existing electrical systems in the flour milling and grain elevator industries, much of the trouble came from chisellers and incompetents, who are not familiar with losses. The cure is to make this work a specialty and build a reputation, so they will come to you.

Quicker Baking

Dynamo & Motor Exchange, Inc., of Buffalo, is experimenting with a hot air blast drying system to speed up the normal time of motors in the oven. Shop Superintendent G. A. Frosdick has arranged a blower with electrical space heaters and is trying it out with good success.



THAT SACRED COW—Are you still worshipping her—No. 14 on branch circuits?

PUTTING BUS OVERHEAD MEANS LESS *"overhead"*

Alcoa Aluminum Bus to enameling furnace of the A. O. Smith Corporation

Have you considered how the lightness of Alcoa Aluminum Bus Bar helps in planning efficient layout? Lightness permits you to put runs overhead or in other out-of-the-way places where they do not occupy valuable space. Lightness means minimum expenditure for supporting structures.

That is one reason for choosing Alcoa Aluminum Bus Bar. Also important are the facts that standard fittings for Aluminum Bus are simple and inexpensive, that the resistance to corrosion of Alcoa Aluminum gives properly installed runs a special advantage where there is exposure to sulphur laden atmosphere and corrosive fumes. The reliability is proved by years of uninterrupted service in many installations.

For ordinary loads, use flat Alcoa Aluminum Bus Bar (as illustrated). For high voltage substations, tubes are preferred. When requirements call for high capacity and superior mechanical strength to withstand large short-circuit stresses, good practice favors Channeluminum, the *rolled* channel section. ALUMINUM COMPANY OF AMERICA, 2197 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA · ALUMINUM

WITH THE Manufacturers

Lincoln Electric Appointments

Lincoln Electric Company of Cleveland has appointed F. M. Maichle as manager of its Detroit arc welding sales-engineering office. He was formerly manager of the company's Pittsburgh office.

W. R. Persons has been made manager of the Pittsburgh office to succeed Mr. Maichle.

W. W. McClellan has been appointed to the sales engineering staff of the Grand Rapids, Mich., office.

•

American Steel & Wire Co. has elected John May as vice president in charge of sales, succeeding Dennis A. Merriman, who is retiring after more than 46 years of service with the company. Mr. May was formerly general manager of sales.

•

C. Sam Swanson has been appointed a representative of the Harnischfeger Corporation of Milwaukee, for the entire state of Michigan. His office is located at 1702 Kale Building, Detroit.

•

C. F. Cate has been appointed agent for the Roller-Smith Company of New York. He will cover the Southwestern portion of Texas and the Southern portion of New Mexico.

•

Glen H. Treslar has been appointed assistant sales manager of Black & Decker Mfg. Co., Towson, Md.

•

Linde Air Products Company of New York is opening a new office at 729 North Pennsylvania Street, Indianapolis, Ind.

The Boston District Office of this company has moved to new offices at 441 Stuart Street, Boston, Mass.

A new sales office has been opened in Oakland, California. It is located at 3710 San Pablo Ave.

Triangle Conduit & Cable Co., Inc. of Elmhurst, New York, has appointed the George Butler Electric Sales Co. as its representative in the Northern half of Illinois, Southern half of Wisconsin and the states of Indiana, Iowa and Nebraska. Headquarters are located at 552 West Adams St., Chicago.

•

Duro-Test Corporation, manufacturers of incandescent lamps, has moved into its new plant, consisting of 50,000 sq.ft. of space, in North Bergen, N. J.

•

Steel and Tubes Personnel Changes

Herbert A. Benfield has been appointed manager of conduit sales for Steel and Tubes, Inc., Cleveland. Mr. Benfield was formerly district sales manager in San Francisco.

Arthur D. Grove, of the Chicago office of this company has gone to the Coast to become district representative in Northern California and Nevada, with headquarters at 718 Rialto Bldg., San Francisco.

BRIDGE WELDING—There is no hand tied reinforcing steel on the new Golden Gate Bridge over San Francisco Bay. The trusses, spaced on six inch centers, are electrically tack welded to the floor stringers. Over half a million one inch welds were made in 75 days with six 300 ampere portable gas driven P&H Electric welders.

Cutler-Hammer Appointments

The following changes in personnel have been announced by Cutler-Hammer, Inc. of Milwaukee.

A. R. Johnson has been appointed manager of the Merchandising Sales Division of this company. His headquarters will be at Milwaukee.

E. F. Weiss has been named manager of its district office, located at 2755 E. Grand Blvd. He succeeds Mr. Johnson.

E. T. Rees has been appointed manager of the Cutler-Hammer branch sales office at Indianapolis. The office is located at 307 N. Pennsylvania Ave.

F. J. Woldrich has been put in charge of the new branch sales office in Portland, Ore., located at 625 N. W. Everett St.

W. E. Ragsdale has been named manager of its Dallas, Texas office, located at 624 Santa Fe Bldg.

•

The Clark Controller Company of Cleveland, Ohio, has let contracts for a second story addition to its plant. The new space will provide more room for the development, research and engineering departments.

•

McGraw Electric Company has started the construction of a new $250,000 plant at Elgin, Ill. The company expects to complete building operations about January 1, 1938.

•

J. M. McKibbin, Jr. has been appointed apparatus advertising and sales promotion manager of the Westinghouse Electric & Manufacturing Company. His headquarters will be East Pittsburgh, Pa.

•

Frederick D. Benz, formerly manager, Wire Sales, Chicago Branch, United States Rubber Products, Inc., has been appointed district manager of Wire Sales, Pacific Division, for the same company, with headquarters at San Francisco.

•

Frank S. Montgomery has been named advertising manager of General Shaver Corp., a division of Remington Rand, Inc. Mr. Montgomery was formerly advertising manager of Byrant Electric Company.

•

Tork Clock Company, Inc. announces the appointment of Henry W. Clower and Associates as representative in the Southeastern United States, with headquarters at 36 Alabama Street, Atlanta.

PANTHER *and* DRAGON TAPES

1. First to be Wrapped and SEALED in Cellophane.
2. Perfect Adhesiveness and Tensile Strength.
3. Strong Distinctive Green Core.
4. Colorful Attractive Boxes.
5. A Company in the Insulation Business Since 1878.

HAZARD INSULATED WIRE WORKS

Division of **THE OKONITE COMPANY**

FACTORIES: WILKES-BARRE, PA. · PASSAIC, N. J.

WE STILL MAINTAIN OUR ORIGINAL POLICY OF SELLING THESE TAPES THROUGH LEGITIMATE WHOLESALERS ONLY

EQUIPMENT News

Swing Bracket Outlet

Swing bracket fixture for bathroom with a three way switch, giving three degrees of light from a 3-U-Lite bulb, 40 or 60 watts for normal use, and 100 watts when needed. 20-40-60 watt bulbs can also be used. Convenience outlet is handy for electric razor or vibrator. Efcolite Corporation, Trenton, N. J.

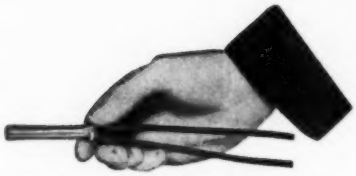
EFCOLITE SWING BRACKET

■

Disc-Brake Motor

The "disc-brake" motor combines in one unit the functions of a motor with those of a powerful brake. Useful for small cranes, hoists, auxiliary movements on machine tools and other equipment in which quick, automatic and accurate stopping or holding of load is necessary. It is claimed that with these disc-brake motors it is often possible to connect drive direct and avoid need for clutches. Consist of compact disc-type friction device, mehanically and automatically engaged when current is shut off and magnetically disengaged when current is applied. Reliance Electric & Engineering Co., Cleveland, Ohio.

RELIANCE DISC-BRAKE MOTOR



GENERAL ELECTRIC HEATING UNIT

Heating Unit

Small cartridge-type heating unit for use where a "spot" of heat is required within a limited space. Unit is ⅜-in. in diameter and manufactured with brass sheath for maximum operating temperature of 750 degrees F. Convenient for built-in applications and can be quickly installed. Available in rating of 30, 75 and 90-watts at 115 or 230-volts, a.c. or d.c. General Electric Co., Schenectady, N. Y.

■

WESTINGHOUSE SWITCHGEAR UNITS

Switchgear Units

A line of factory-built metal enclosed switchgear for shipment as a complete assembly, suitable for small industrial installations or auxiliary circuits in steam power stations. Units are factory assembled and tested so cross connections do not have to be made in the field. Consists of cubicles in which are mounted circuit breakers, buses, disconnecting switches, instrument transformers and similar auxiliaries. Desirable relay and meter equipment mounted on front panels. Disconnecting switches located in upper compartment and are hookstick operated. Westinghouse Electric & Manufacturing Co. East Pittsburgh, Pa.

Heat Resisting Paint

Valdura aluminum paint is recommended to maintenance engineers for use on all metallic surfaces subjected to temperatures ranging up to 1000 deg. F.

It is said to fuse with and become a part of the surface where the temperature exceeds 450 deg. F. When applied while surface is cool, with temperature gradually raised to normal point of operation, a brilliant, silver-like finish unaffected by smoke, fumes, chemicals or moisture, is claimed. Recommended for use on manufactured articles, boiler fronts, stacks, steam pipes, kettles, stoves and other metallic surfaces subjected to high temperatures. American Asphalt Paint Co., Chicago, Ill.

■

ERICSON RUBBER SOCKET

Rubber Socket

C & E safety switch socket with ⅜-in. bushing, especially adapted for use in machine shops where it is subjected to metallic dust. Also weatherproof and coated with a baked lacquered finish making it acid and oil resisting. Ericson Manufacturing Co., Cleveland, Ohio.

■

Amplifier System

The Soundmaster is a self-contained microphone-amplifier-loud speaker system designed to meet the need for a light, five minute set-up unit for use by public speakers, soloists, orchestras, showmen. Powerful enough for audiences up to 3,000 and outdoor areas up to 25,000 sq. ft. Two extra inputs provided for microphone, music pickup or phonograph. Audio power output is 12 watts. Equipped with 12 inch, 15 watt speaker. Operates directly from 110-volt, 50 to 60 cycle lines and converters for battery operation. Industrial installations used for inter-department calling and paging, between sales counter and stockroom, bus and railway stations, theatres. Sundt Engineering Co., Chicago, Ill.

SUNDT SOUNDMASTER

Ten million youngsters drink a toast in healthful milk — *to steel*

Milk travels a long route from the cow to your youngster's cup . . . . a route made possible -- *made safe* -- by steel.

In modern dairies, cows are milked by sanitary steel milking machines. Milk pails and cans are of steel for positive sterilizing. Steel trucks bring the milk to market. Steel pasteurizers insure its safety. Steel wagons deliver the milk to your street, and in a steel basket the milkman carries it to your door.

So begins your day, in which steel plays an all-important part. You shave with a steel razor. Your coffee "perks" in steel. You ride in a steel car, to work in a steel-framed building, at steel machines, typewriter or desk. Your dinner is cooked on a steel range, you read at a lamp wired through steel conduit, you go to sleep on steel springs. Youngstown makes these steels -- each steel developed by research to best serve its purpose. That is why you, the user of conduit, can *depend on Youngstown.*

QUALITY TRADE MARK YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - - YOUNGSTOWN, OHIO

YOUNGSTOWN

Sheets - Plates - Pipe and Tubular Products - Conduit - Tin Plate - Bars - Rods Wire - Nails - Unions - Tie Plates and Spikes

25-2A

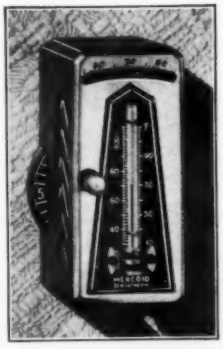
EQUIPMENT NEWS

[FROM PAGE 96]

Disc Pressure Fan

Disc pressure fan available in three types, the "H", the "HL" and the "L". "L" type is for installation where large volumes of air are desired at free delivery or very low static pressures. "HL" for moderate static pressures and the "H" for high static pressures. Have a non-overloading power characteristic. As current consumption is constant under any pressure from free delivery to no delivery, motor cannot burn out. Eliminates use of over-sized motors and effects savings in power consumption. De Bothezat Ventilating Equipment Division of American Machine and Metals, Inc., 100 Sixth Ave., New York, N. Y.

DE BOTHEZAT DISC PRESSURE FAN



MERCOID SENSATHERM

Day-Night Sensatherm

The Sensatherm is a low cost day and night temperature regulating thermostat. Automatically restores room temperature to normal day setting before family arises. Timing mechanism can be set for any period up to a nine hour interval. Calibrated dial on side indicates time interval for which instrument is set. Hold temperature to any predetermined setting within a total differential of one degree Fahrenheit. Standard range is 55-85-deg. Fahrenheit. Mercoid Corporation, 4201 Belmont Ave., Chicago, Ill.

The NEW FA "DUBLBRAK"

CIRCUIT BREAKER insures double value performance

It protects lighting and appliance branch circuits against sustained overloads or short circuits when protection is needed.

YET because of the properly engineered time lag feature of the thermal element unnecessary and annoying interruptions of service are avoided.

WHEN YOU SELL FA "DUBLBRAK" YOU SELL PROTECTION AND CONTROL

Approved by Underwriters' Laboratories for both AC and DC service 125 volt 6 to 50 ampere. Available January 1, 1938.

Frank Adam
ELECTRIC COMPANY
ST. LOUIS

EQUIPMENT News

[FROM PAGE 98]

Portable Light

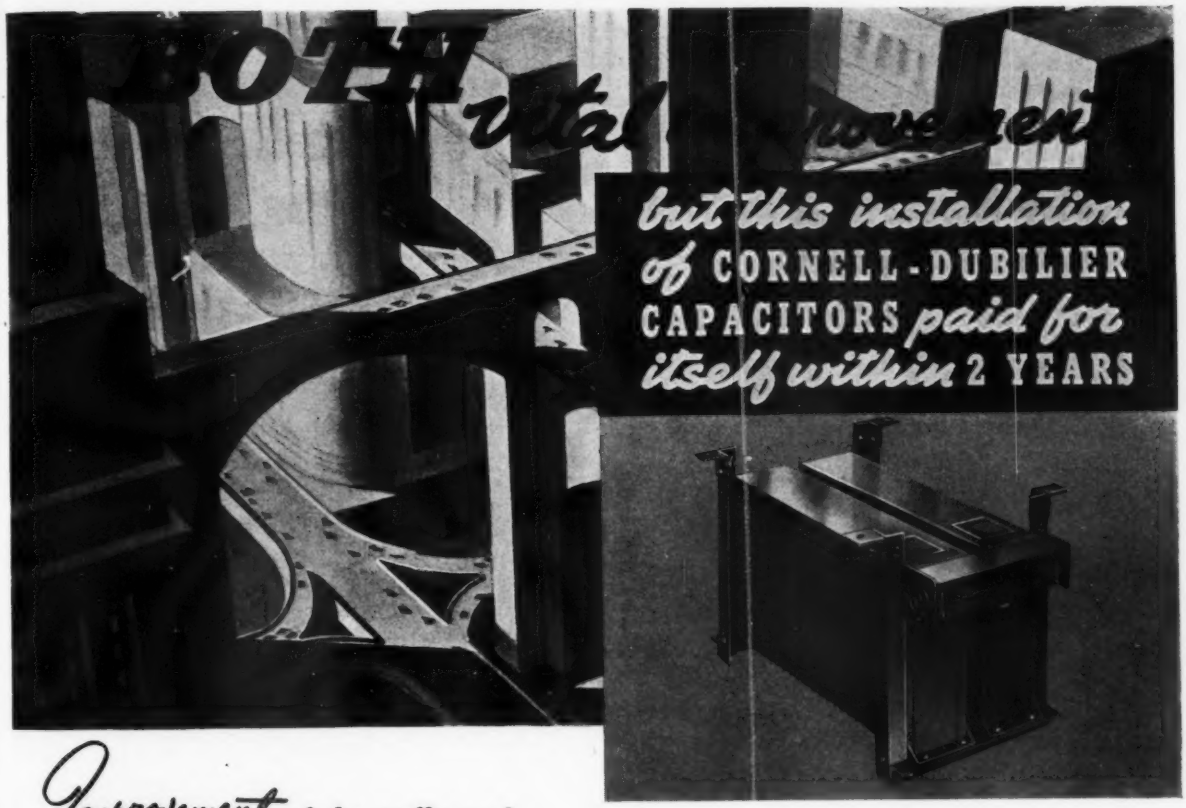
A new type portable light, the Spear-Lite, can be speared into ground wherever light is needed. Made of Vitrolux porcelain enamel, it is designed to stand rigors of outdoor portable use. Unit includes set of cadmium-plated iron castings—1 spear base, 2 brackets and 1 top piece, one 10-ft. length of galvanized ½-in. conduit and a 50-ft. weatherproof cord with plug. Conduit may be supplied by contractor, if desired. For night work or night play. Smoot-Holman Company, Inglewood, Calif.

SMOOT-HOLMAN SPEAR-LITE

HICKOK SWITCHBOARD INSTRUMENT

Switchboard Instrument

Miniature frequency meters, polyphase wattmeters, single phase wattmeters, ammeters, voltmeters, etc. Mounting is flush in round hole 3½-in. in diameter. Instrument flange projects ½-in. in front of panel. The a.c. instruments can be supplied with illuminated dials. Scale is over 3¾-in. long. Case and front made from heavy molded phenolic material, of rugged construction and insulated in accordance with A.I.E.E. specifications. Shield can be supplied for case where necessary to neutralize effect of external magnetic fields. Hickok Electrical Instrument Co., Cleveland, Ohio.



Improvement of the traffic problem has become vital in our metropolitan cities. High-speed automobiles, capable of traveling 90 miles an hour, move no faster than the horse-and-buggies of years gone by.

A system of elevated express highways for the "City of Tomorrow" will cost 57 billions of dollars. Such a project will eventually pay for itself through the increased revenues from greater use of automobiles. Pay for itself, yes —but it will take 45 years.

Improvement of low power factor in this eastern fibre mill * was vital too. Power costs were running extremely high. Cornell-Dubilier engineers were called, recommended capacitor installation of 100 kva . . . original power-factor of 72% improved to 93% . . . average monthly savings . . . in power alone . . . totaled over $80.00 each month . . . $960.00 the first year. Total investment of $1950.00 amortized within *two years and one month.*

You too, can enjoy these PROFITS if your power contract includes a power-factor adjustment or kva demand clause! C-D field engineering offices throughout the United States are ready to consult with you regarding your plant requirements. Clip convenient coupon and mail for more information TODAY.

*Name available on request.

WORLD'S LARGEST AND OLDEST EXCLUSIVE MANUFACTURER OF CAPACITORS

CORNELL DUBILIER

Capacitors

FOR POWER-FACTOR CORRECTION

CORNELL-DUBILIER ELECTRIC CORP.
SOUTH PLAINFIELD, N. J. EC 11

Please have your representative call ☐
send catalog ☐

Name.....

Address.....

City.....*State*.....

EQUIPMENT NEWS

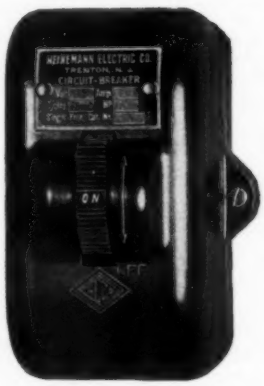
[FROM PAGE 100]

Vapor-proof Fixture

"Front Glass" vapor-proof and dust-tight fixtures employ two-piece canopy construction for easy wiring and large reflector neck openings for removing reflector without disturbing lamp. Available for pendent suspension, and for direct attachment to 4-in. outlet boxes. Cast-iron canopy top and porcelain enameled steel canopy body with built-in aluminum baffle plate. Wheeler Reflector Co., 275 Congress St., Boston, Mass.

WHEELER VAPOR-PROOF AND DUST-TIGHT FIXTURE

■



HEINEMANN ELECTRIC CO.

Circuit-Breaker

Non-thermal "Re-Cirk-It" breaker available in capacities from 50 milliamperes to 35 amperes. Has tumbler handle switching current on and off. Two types—instantaneous trip and time-delay action, provided with hermetically-sealed magnetic trip rupturing circuit in from 5 seconds up to 8 minutes on a 125% load, or faster on greater overloads. On short circuits, trips within ½ cycle on a.c. or 1/100 second on d.c. Heinemann Electric Co., Trenton, N. J.

Heating Unit

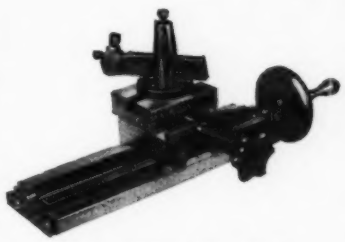
A "strip" heater with offset terminals, that facilitate wiring and arrangement of strip heaters in series. New units, except for terminals, are similar in construction to standard G-E strip heaters. Available in convenient lengths and ratings. Also a busbar for use with this unit, with holes punched at frequent intervals to fit offset-terminals and allow a wide choice for spacing heaters. General Electric Co., Schenectady, N. Y.

GENERAL ELECTRIC HEATING UNIT

■

Turning Tool Head

This turning tool head is designed for use with either "Perfect" or "Ideal" model precision grinders and is interchangeable with top part or cross slide of regular grinding head. When using turning tool, commutator must be turned over slowly. Consists of high speed steel tool bit, tool holder, hardened tool post, spot finished cast iron base and tool post wrench to fit set screws on tool post and holder. Ideal Commutator Dresser Co., Sycamore, Ill.



IDEAL TURNING TOOL HEAD

■

Electrical Resistor

Evenness of windings in these electrical resistors, prevents "hot spots" which oxidize and burn out. Made possible by improved type of vitreous enamel with which these resistors are covered, holding wire in place as it was wound and forming ready path to conduct heat away. Contact is assured at terminals because resistance wire is both mechanically locked and brazed to terminal lugs. Equipped with mounting brakets to hold units in place and permit ease of mounting and demounting. Ohmite Manufacturing Company, 4835 West Flournoy St., Chicago, Ill.

OHMITE ELECTRICAL RESISTOR

Advertisers' Index

*See 1936–1937 Buyers' Reference number of Electrical Contracting for additional information on these companies and their products.

LEGAL NOTICE

STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS of CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of Electrical Contracting, published monthly, at Albany, N. Y., for October 1, 1937.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared D. C. McGraw, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Electrical Contracting, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher, McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, N. Y. C. Editor, Earl Whitehorne, 330 West 42nd Street, N. Y. C. Managing Editor, none. Business Manager, Glenn Sutton, 330 West 42nd Street, N. Y. C.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) McGraw-Hill Publishing Company, Inc., 330 West 42nd St., N. Y. C. Stockholders of which are: James H. McGraw, 330 West 42nd St., N. Y. C. James H. McGraw, Jr., 330 West 42nd St., N. Y. C. James H. McGraw, James H. McGraw, Jr., and Curtis W. McGraw, 330 West 42nd St., N. Y. C., Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw, Curtis W. McGraw, Curtis W. McGraw, 330 West 42nd St., N. Y. C. Donald C. McGraw, 330 West 42nd St., N. Y. C. Anne Hugus Britton, 330 West 42nd St., N. Y. C. Mildred W. McGraw, Madison, N. J. Grace W. Mehren, 32 West Grand Ave., Chicago, Ill. J. Malcolm Muir and Guaranty Trust Co. of New York, Trustees for Lida Kelly Muir, 524 Fifth Avenue, N. Y. C. F. S. Weatherby, 271 Clinton Road, Brookline, Mass. Elsa M. Wilsey, Madison, N. J.

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4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is. (This information is required from daily publications only.)

D. C. McGRAW, Secretary.

McGRAW-HILL PUBLISHING COMPANY, INC.

Sworn to and subscribed before me this 27th day of September, 1937.

[SEAL] H. E. BEIRNE.

Notary Public, Nassau County. Clk's No. 74. N. Y. Clk's No. 192, Reg. No. 8-B-115.

(My commission expires March 30, 1938)